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Original Articles

Finger-tip Infections

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It has frequently been stated, and it has been the experience of the writer to find, during a period of many years in a surgical out-patient department, that infections of the fingers are, as a rule, handled with abominable judgment and with a woeful lack of surgical sense and skill. Every few days we see the evidences of delayed or improper surgery, which results in deformity and loss of some function, in addition to a great loss of time, not to mention the hours of needless pain and loss of sleep. A proper conception of the pathology and the anatomical features governing its course will render it an easy matter to handle these cases, with a much reduced pain period, less loss of time, less deformity, as well as less serious results from a spread of the infection. It is the purpose of this paper to consider the acute infections occurring in that portion of the finger corresponding to the diaphyseal portion of the distal phalanx.

Anatomy.—The skin covering the terminal phalanx is tightly adherent to the underlying structures and can be moved but little. On the dorsum the epidermal layer becomes specialized in part and forms the nail. The body of the nail rests on the corium or true skin, which is closely attached to the periosteum of the phalanx, the lateral margins of the nail being overlapped by a duplication of the skin, while the root of the nail is embedded under a fold of the skin (Fig. 1, A). The anatomical arrangement explains the fact that infections beginning superficially around the nail tend to spread rapidly under the horny layer or stratum lucidum, which forms the nail proper, but still remain superficial to the true skin, the stratum mucosum. In other words, the nail is really a specialized stratum lucidum, covered at the edges by the overfolding skin in all its layers, the stratum corneum being vestigial and now existing as the eponychium. A study of Fig. 1 will explain the superficial course taken by infections around the nail on the dorsum of the fingers, and why these infections never destroy the nail bed, the matrix, or the bone, unless they start from a deep focus.

Much more attention has been paid to the palmar surface of the finger, chiefly because of the more serious consequences of infection in the finger pulp. Kanavel has published a most admirable work on the subject and shows clearly the anatomy and its pathological importance. Dorrance added to the anatomical knowledge and put it to practical use, advocating, as did Foote, a transverse incision for felons. Piersol states that the pulp of the finger is closely attached to the periosteum and is made up of a dense fibrocellular mass. This mass is so constructed as to form a closed sac with fibrous trabeculæ radiating from the periosteum to attach to the thick skin. These compartments contain fat and glands and are practically closed, which fact Dor-

rance showed by red lead injection. G. G. Davis states that "the pulp of the finger resembles that of the heel, the scalp, the palm of the hand, etc., in the fact that the under surface of the skin sends off firm fibrous bands or fibrils which are attached to the parts beneath. The spaces between these hands are filled with fatty tissue, etc."

Recent dissections made by the writer show this condition very clearly. Fig. 1, B and C, drawn from the specimens, show this in both the longitudinal and transverse section. For want of a better illustration we might liken the arrangement to that shown in an orange, sectioned at right angles to its stem axis. Crossing these wedge-shaped interfascial spaces are transverse fibrous bands which, however, are less extensive and less dense and give way to pus pressure before the chief fascial planes that extend from periosteum to skin. This explains the condition that always presents, namely, that pus burrows toward the bone and not laterally in the pulp (Fig. 1, Ba).

Infection in one of these radiating compartments will be guided by the connective tissue walls toward the skin and toward the bone, and the resulting destruction is governed entirely by the blood supply. The digital arteries, coursing laterally down the fingers, send branches to the epiphyseal end of its distal phalanx and then enter this closed sac to supply the diaphysis. When the swelling from the infection in the tight confines of the sac increases enough, the artery is compressed and the blood supply to the bone and subcutaneous tissues is shut off. The periosteum is prevented from being lifted, by reason of Sharpey's fibers attaching it tightly to the bone. This further increases the intraosseous pressure,

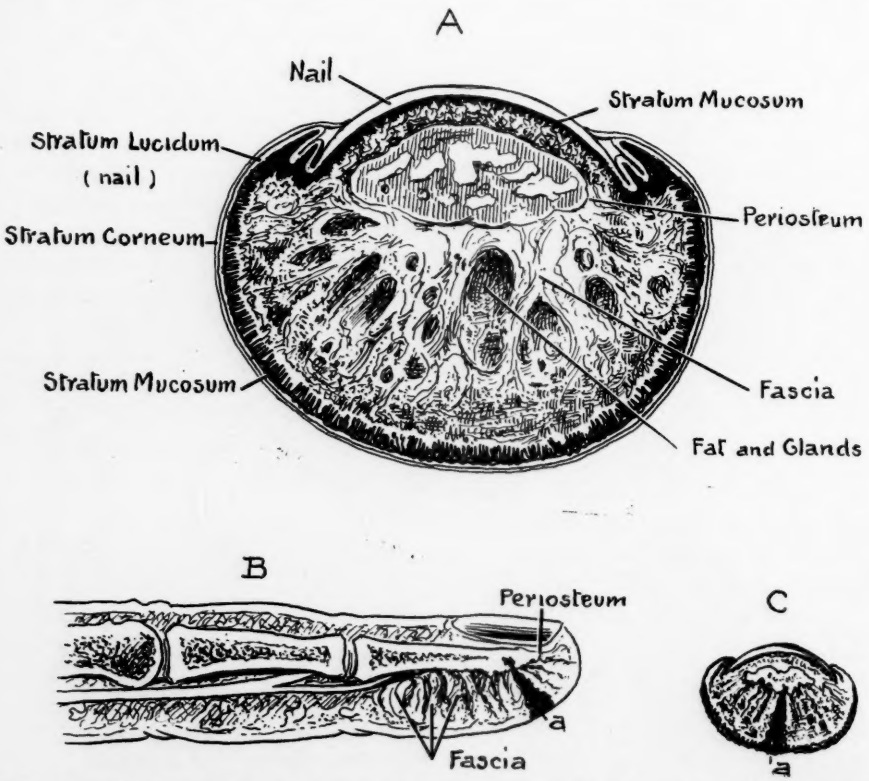

FIG. 1.—A, cross-section of a finger showing the fascial bands passing from skin to bone. B, fascial sacculation, limited to diaphysis of distal phalanx, stopping short of epiphysis and the insertion of the flexor tendon. The dark area "a" represents the course taken by the pus.

and necrosis occurs early and rapidly. The skin on the other hand is more elastic and receives blood supply through a rich, superficial anastomosis—hence it escapes until the very last. The above facts account for the early throbbing pain out of all proportion to the external evidences of infection. This closed fibrocellular sac stops short of the epiphysis, hence the latter escapes destruction. This same fact accounts for the flexor tendon practically always escaping infection, which would add a whitlow to an already existing felon. This almost never occurs except in extreme cases of neglect.

The final anatomical point to bear in mind is that the nerves course down the

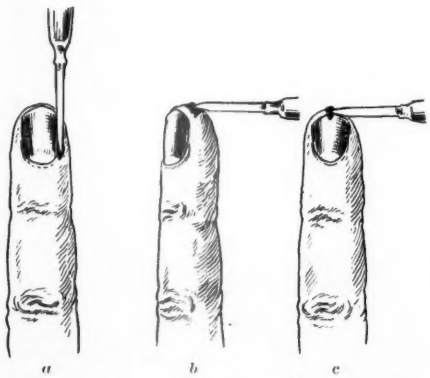

FIG. 2.—Methods of opening subepithelial pus collections.

sides of the digits and are placed nearest the palmar aspect, a fact to be remembered when the incision is planned in opening these infections. A properly placed incision will be lateral to and at the same time will parallel the nerve and artery line, passing between the bone dorsally and the nerve and vessel on the palmar aspect. An incision so placed interferes not at all with subsequent sensation in the finger-tip, nor will it result in any noticeable deformity.

The dorsal infections may be classed as subungual abscesses, subepithelial abscesses (local and diffuse), and paronychia.

Subungual Abscesses.—As a result of puncture wound, with a splinter, a pin, a brush bristle, a steel chip, just under the free border of the nail, or resulting from a "turn-back" nail, a wound is made and becomes infected. The point of the nail becomes sensitive, and "point" pressure, made by gently touching the suspected spot with

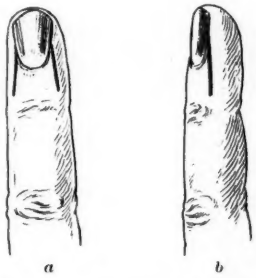

FIG. 3.—Outlines for incisions for paronychia.

the point of a pencil, a probe, or some such object, causes a localized sticking pain. This is a localized infection between the nail bed and the nail proper. In other words, it is not under the true skin and is consequently not too dangerous to try and abort. This can be done by applying a constantly wet alcohol dressing in the very earliest stage of the first noted tenderness or a hot wet dressing of salt solution, boric acid solution, or saturated mag. sulph. solution. Instruct the patient to leave the dressing on the finger and submerge it in the hot solution, holding it submerged for ten minutes every three or four hours. Warn him to start with the solution only

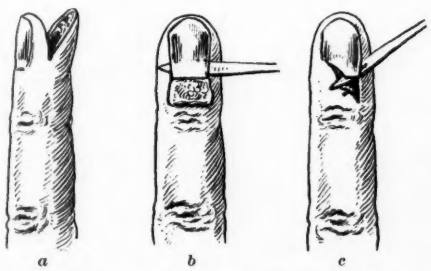

FIG. 4.—*a*, Transverse incision for felon. *b*, Incision exposing the nail root for neglected paronychia where the pus had burrowed across. *c*, Incision for pus under an edge of the nail root.

warm and gradually add hotter solution as bearable. Submerging a bandaged finger in very hot solution may scald it, whereas an unwrapped finger might find the solution

easily bearable. Within a few hours the infection is either conquered or a small white spot appears shining through the nail. Under the free border of the nail there appears a slight bulge. A sharp cataract knife slipped into this spot, from the lateral direction, requires no anesthetic, and cures the patient (Fig. 2, *c*).

Subepithelial abscesses result from hangnails, puncture wounds, local injuries around the skin, overlapping of the nail, or may be associated with more extensive infections, raising the epithelium over a considerable area, extending over both the extensor and flexor surfaces. Seen early, the local abscess may be opened with the cataract knife, inserted parallel with the surface and without anesthetic. Inserting the knife thus without pressure causes no pain as the epithelial layer is insensitive. It is the knife pressure that causes the pain. If the infection is diffuse and has raised the superficial skin over a wide area, even involving the entire finger end, it will appear as a purplish-gray fluctuant swelling, which should be opened by snipping with a sharp scissors, thereby releasing a thin pus. The entire raised epithelium should be cut away with forceps and scissors, exposing the red glistening true skin. No anesthetic is needed for this procedure (Fig. 2, *b*).

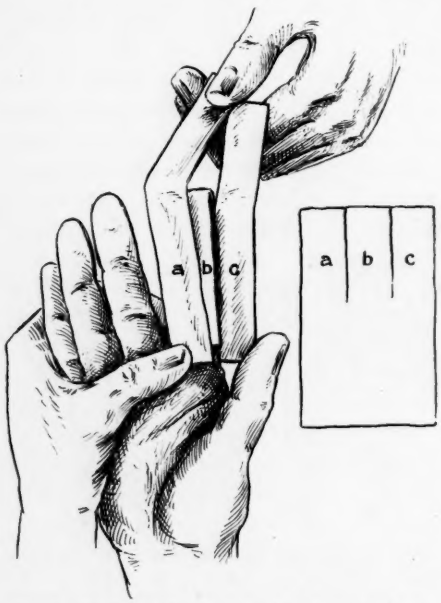

FIG. 5.—The three-tailed gauze used for finger dressings.

Paronychia or "run around" is an infection at the side of the nail, starting in the epidermal layer of the overhanging skin. It is caused by an infected wound with a splinter, pin, nail file, scissors, or secondary to a hangnail (agnail). The simpler type is an acute localized rice-grain-sized abscess in the subepithelial tissue. This forms rapidly, a matter of hours, and is easily recognized and cured by resorting to the cataract knife, inserted paralleling the nail margin (Fig. 2, *a*).

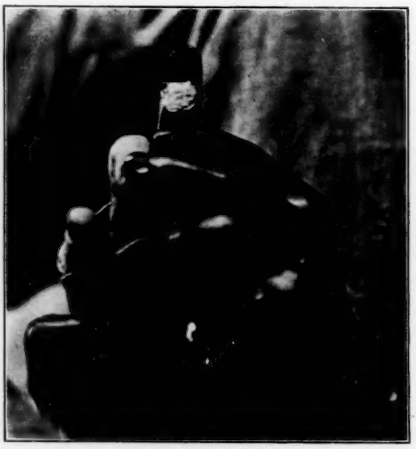

FIG. 6.—The actual transverse incision advocated.

The second type is more phlegmonous and slower in developing. It apears as a red swelling beside the nail. This is very tender and somewhat painful. Alcohol wet dressings, when first noticed, or hot soaks, if the condition is a few hours old, may dissipate the trouble. If after twenty-four hours there is no improvement, an incision should be made under gas anesthesia (Fig. 3, *b*). A small strip of rubber dam is laid in the wound and a wet Wright's solution dressing applied and kept moist and hot by repeated submersions.

If the infection has spread around under the corner of the nail root, as shown by the dull whitened appearance to the nail at

that spot, the flap should be turned back, the flat end of a probe inserted under the dead portion of the nail turning it up to be removed with the scissors (Fig. 4, *c*). If neglect has allowed the infection to completely cross the nail, a bilateral incision should be made, the cuff turned back and the devitalized portion of the nail lifted and removed with the scissors (Fig. 4, *b*).

These cases have a most offensive, peculiar odor, different from any other finger infection, which when encountered always indicates that the infection has undermined the nail root. The firmly fixed portion of the nail should be left *in situ*. The raw surface is covered with paraffin mesh or gauze impregnated with albolene or some unguent to render dressings less painful. A hot moist dressing is applied as above mentioned for a day or two, then the flap is dropped into place, and the finger dressed with paraffin mesh and dry gauze, or dichloramine-T. A simple method of covering the sides and end is by a gauze dressing 3 x 4 inches, cut half-way down into three

FIG. 7.—The finger to the left was opened with transverse cut. The finger to the right was opened with the common palmar incision. Note the scar in the latter.

tongues (Fig. 5). Excessive granulations will pout up on the exposed nail bed, but the new nail will flatten these down as it grows out behind the old nail remnant.

Acute infections on the palmar aspect of the finger end may be classed as superficial and deep. They really are one and the same, differing only in the extent of the disease. Both are due to puncture wounds, by pins, needles, steel fragments, splinters

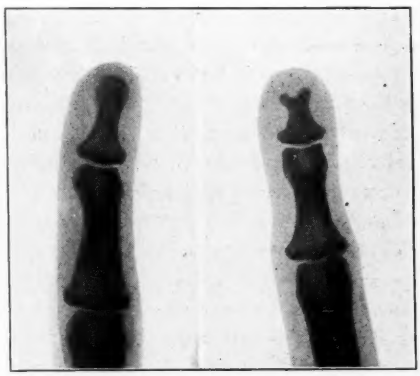

FIG. 8.—The finger on the left was opened early (24 hours) by the transverse incision; note the normal bone. The finger on the right was opened late (72 hours) by a palmar incision; note the loss of bone.

of wood, etc. The condition is a common one among nurses, resulting from pin punctures. The only primary felon is a syphilitic one.

A few hours after the wound the patient notices a sticking sensation when the finger is pressed upon. In a short time the finger begins to throb and may or may not appear swollen, depending upon whether the skin is thin and soft or thick and callous. A throbbing finger with "point" pressure pain means pus, and it should be opened within twenty-four hours. Often the patient will object to opening at once. If so, don't paint with iodine, but use hot soaks every three hours, leaving a wet dressing on the finger constantly. Should examination then reveal a small whitish spot at the tender area, the cataract knife inserted laterally without anesthetic will relieve the condition with but little discomfort. If, however, the infection is not so superficial, the finger continues to throb, and becomes tense and hard, it should be opened under a general anesthetic at the earliest possible moment. Often twenty-four hours are sufficient for the infection to reach the bone (felon), re-

sulting in osteitis and necrosis (Figs. 8, 9, 10).

After the tissues begin to lose their vitality, and this happens very rapidly, thirty-six to forty-eight hours, the agonizing, throbbing pain and exquisite tenderness become less, and the patient and an unwary surgeon erroneously suspect improvement. Not so—this lull is but the sign that delay has been costly.

Never attempt to incise these cases under local anesthesia of any sort, with the exception of nerve block at the web. With gas anesthesia and a tourniquet applied, make the Foote or Dorrance incision, which is a transverse one across the finger-tip at or near the tip (Figs. 4*a* and 6). A bloodless incision permits accurate penetration, as one can easily trace the necrotic wedge down to the bone. The incision is placed within ⅛ inch of the nail and parallels the nail from one side of the base to the other, passing to the palmar side of the phalanx, its depth reaching the extent of the necrosis.

This incision gives the best functional and anatomical result, and further, a point

FIG. 9.—Felon allowed to go five days before incision. Note necrotic phalanx protruding.

not stressed by its originator, it minimizes the failure to locate the pus pocket as it opens all the fascial compartments. A median incision many times opens normal tissues, and the drop of pus existing to either side of the incision is still undrained. This explains why the surgeon "obtained dark blood but no pus, the pus appearing four or five days later."

The flap is held back by a rubber or

FIG. 10.—Felon allowed to go four days before incision. Note the necrotic phalanx protruding.

anointed gauze drain. Should the point pressure tenderness be lateral, the incision is placed laterally and need not encompass the finger-tip. The finger is given hot soaks until the necrotic tissue has sloughed out. The flap is then replaced and bandaged in place. In all these cases rest, preferably by splint and sling, or even elevation for the first few hours, will give the most comfort and the speediest convalescence.

SUMMARY.

1. A throbbing "point" pressure painful finger pulp should be opened within twenty-four hours.

2. The peculiar anatomy on the dorsum of the finger-end tends to keep most infections superficial, but on the palmar aspect causes a rapid, deep and destructive condition.

3. The transverse incision gives the best immediate and ultimate results in felons.

4. Incisions should be made under general anesthesia and preferably behind a tourniquet.

5. Rest, moist hyperemia and adequate early drainage sum up the situation.

A Case of Extensive Exfoliative Dermatitis Secondary to Lymphatic Leukemia Strikingly Improved After Radium Treatment

BY WILLIAM NEILL, JR., M.D.
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Few morbid processes present greater variations in either progress or clinical manifestatons than Hodgkin's disease and the leukemias. The course may extend from a few weeks to several years. Tumefaction may be pronounced and the constitutional disturbances slight, but often the reverse may be the case. The patient may come for help for pruritus with or without skin rash, shortness of breath, or for the enlarged glands, or pallor, palpitation, or other symptoms of anemia. Nor is anemia a necessary accompaniment of all stages of the disease; the patient may even look sound and healthy. Without treatment, however, all recorded cases have ended in death.

Recently there came under our observation and treatment a patient with an intense general exfoliative dermatitis associated with a chronic lymphatic leukemia. He was white, aged fifty-three years; hist. number 11457; family history negative; his general health had been good. In 1918 he had influenza with a generalized rash like scarlet fever, which disappeared in three weeks. He was operated upon early in 1919 for an acute appendicitis. A few months after this he noticed thickening and encrusting of the skin over the palms and the soles without itching. After this he never felt well. This skin condition never cleared up, but gradually increased until by the fall of 1922 the entire skin of the body was covered by an intense, reddened dermatitis with exfoliation and marked pruritus. The skin covering the face, hands and feet would crack and bleed. The only treatment he received was the local application of salves and lotions, with no improvement. In May, 1923, being in the United States army, he was sent to The Walter Reed Hospital in Washington, where a general glandular enlargement was found with the blood picture of R. B. C. 3,650,000, W. B. C. 116,000, Hbg. 65 per cent; small lymphocytes 89 per cent, large lymphocytes 8 per cent, and polymorphonuclear leucocytes 3 per cent. The Wassermann reaction was repeatedly negative. He was treated with arsenic and preparations of benzene and put on a low carbohydrate diet. With one month of this treatment there was no improvement in the constitutional symptoms, the glands were not reduced in size, and the skin continued unchanged, while the blood picture presented R. B. C. 3,300,000, W. B. C. 23,000, Hbg. 65 per cent; small lymphocytes 92 per cent, polymorphonuclear leucocytes 8 per cent. He was referred by The Walter Reed to The Howard A. Kelly Hospital June 8, 1923, when I first saw him.

On examination the patient was in evident marked distress, occasioned by the constant intense itching over the entire body. The whole skin from the scalp to the soles of the feet was the seat of a deep-red, scaly, thickened, inflammatory condition, with universal marked exfoliation (see Fig. 1). The calloused skin around the base of the fingers and toes was cracked and bleeding in places. There was a general glandular enlargement, the glands all remaining discrete and measuring from 1 to 2½ cm. in diameter; no mediastinal mass was disclosed by the *x*-ray. The abdominal examination was also negative, and the spleen and liver were not felt. The heart and lungs were negative; blood-pressure 120/80 and the blood picture R. B. C. 4,140,000, W. B. C. 52,800, Hbg. 70 per cent; P. M. N. 20 per cent, S. L. 79 per cent, and L. L. 1 per cent. The Wassermann reaction was negative, as was the urine, both upon routine and chemical examination.

Radium treatment was instituted June 8

as follows: Over one area either side of neck, one area either axilla, one area spleen, and one area either groin, 2000 milligram hours' radiation screened with 2 mm. brass and 2 mm. lead applied at a distance of 2

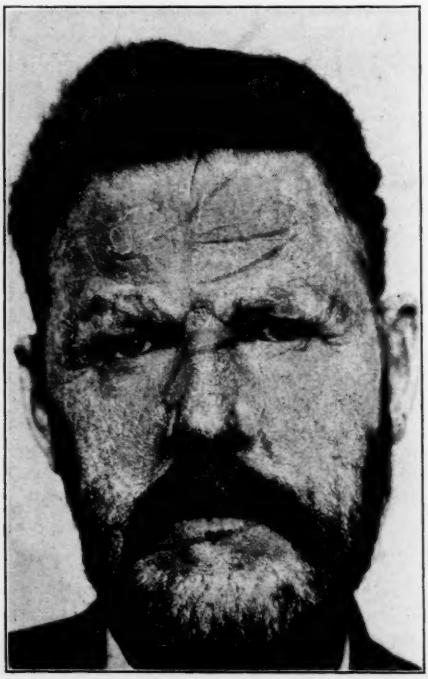

FIG. 1.—Photograph of patient on admission. A similar condition of the skin exists over the entire body.

inches from the skin surface was given over each area.

Olive-oil rubs to the skin were advised and a more liberal diet allowed. He was next seen June 14, 1923, and there was no marked change in the general condition.

The blood picture then was R. B. C. 4,096,000, W. B. C. 31,350; P. M. N. 21 per cent, S. L. 69 per cent, L. L. 4 per cent, and Trans. 1 per cent. The same portals as previously were exposed to radium, using one-half the original dose. The next examination was July 14, 1923, revealing astonishing improvement and a complete clearing up of the entire skin condition. The normal color and texture had returned, and aside from a mild ichthyotic tendency in the palms and soles of the feet the skin was normal (see Fig. 2). He was entirely relieved of the pruritus and felt immensely better and has gained weight. There were no palpable lymph glands. The blood picture was P. M. N. 80 per cent, S. L. 20 per cent; W. B C. 51,200 and Hbg. 80 per cent. No further radium treatment was given.

The patient was again seen at the office August 25, 1923. He has been feeling well. He has had a slight return of itching of the palms and soles, but the skin otherwise remains normal. The blood count showed little change other than a slight increase in the small lymphocytes and a relative decrease in the polymorphs. A radium treatment similar to the one given July 14, 1923, was repeated.

He was last seen October 6, 1923. His general health was splendid. The skin was

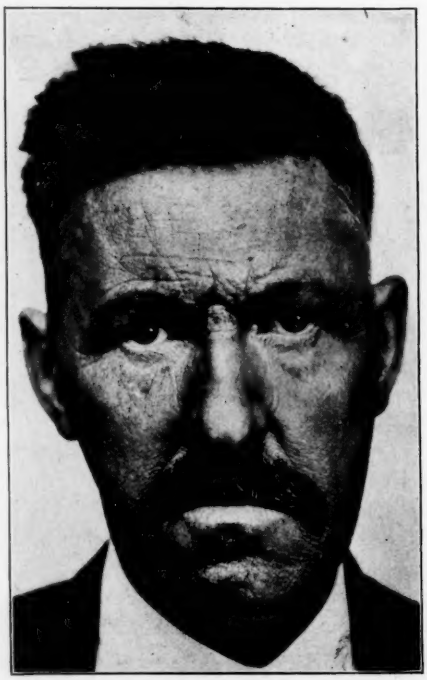

FIG. 2.—Photograph of patient taken thirty-six days after the radium treatment. The skin of the entire body has cleared up.

in the same condition as that found in August. There was a slight improvement in the blood picture. The patient is still under observation and has received no internal medication whatever.

The Surgical Treatment of Burns

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The great war made it imperative for surgeons to take an active interest in the problems presented by traumatic wounds. With the exception of the industrial group, the present generation of surgeons have long been content to relegate the treatment of infected traumatic wounds to their assistants, hospital interns, and student nurses. Because of the small proportion of this type of cases in civil life their indifferent routine treatment and poor results went unnoticed. When the attention of the older surgeons became engaged with this subject their mature judgment and years of practical experience soon made it possible to evaluate the innumerable surgical procedures suggested during the early years of the war. There has never been a better demonstration of Osler's warning to his students, "Young men should read old books—old men should read new books." It is now five years after the armistice, and the consensus of opinion is that very little that is new or original has been added to our surgical knowledge, but that many forgotten surgical principles have become reëstablished. The importance of dead and devitalized tissue in traumatic wounds was emphasized in the writings of Æsculapius, and it was not Pierre Duval and his brilliant group of French sugeons that first practiced débridement, but Larrey during the Napoleonic wars. The recent war experience with burns was no exception, and most that was new has not withstood the tests of time, while many of the forgotten principles of former days have become reestablished. Thus what we have to offer you is old. A compilation, if you will, of all that is best of our former treatment of burns interpreted in terms of our new knowledge of wound infection.

The premature explosion of missiles, the use of actual flame as a weapon, and the introduction of gas in warfare, provided burns of unknown severity for the military surgeon. Our personal experience with these wounds began with the men coming from Verdun in the summer of 1915. These burns had been caused by flaming oil which had been generously applied by attacking Germans. In the autumn of 1915 we had an opportunity of visiting the hospital in which Sanford was demonstrating his treatment of burns with a "wax shell" made of what he called and patented "ambrine." Though his results were better than any we had ever seen before, it was quite evident that his method transgressed many of the accepted surgical principles of wound infection. We will refer to this method later and show that his results were not due to the use of this occlusive impermeable wax shell dressing over wounds containing infected, devitalized and dead tissues, but were obtained in spite of this unsurgical procedure. We suspected at that time and are now convinced that Sanford's results were really due to his efforts to mechanically remove dead and devitalized tissues and to treat the exposed surfaces of these wounds with strict surgical asepsis. Rothchild (Traitement des Brulures Par le Methode Chirique, Pansement a l'Ambrine, Octave Doin et Fils, Paris, 1918) emphasized the necessity for the use of sterilized wax and cotton and of strict surgical asepsis in the application of the dressing, and illustrates the striking difference in the appearance and course of the wounds when these surgical precautions are not taken. In almost all of the descriptions of this method found in English and American literature there is no mention of these essential principles of asepsis. Rothchild's careful description of the sterilization of all materials and utensils used in the application of this shell is in marked contrast with the average care one sees expended in the hospitals in this country upon the paraffin atomizer, the brushes, and the wax, where they are treated with about as

much asepsis as the cabinet-maker gives to his glue-pot.

Our experimental work in the subject of infected traumatic wounds eventually came to include burns. As the accepted surgical treatment of these wounds was so different from that of traumatic wounds we at first ignored them, presupposing their pathology to be different. We soon became convinced that burns are traumatic wounds resulting from extremes of heat or cold, and that the same indications govern their treatment as that of all other types of traumatic wounds. Before developing the subject of the surgical treatment of burns a review of their pathology and a comparison of it with the inflammatory reactions of tissues to other forms of injuries will establish this premise.

The local and general pathologic changes produced by extremes of heat and cold are identical with those produced by other forms of trauma. Variations are of degree only, never of kind.

LOCAL CHANGES.

Inflammation.	Burns.
Congestion.	Erythema, first degree.
Exudation.	Blistering, second degree.
Suppuration.	Suppuration.
Death.	Charring, phlegmon, third degree.
Repair.	Cicatrization.

General Changes. — Primary Wound Shock: Primary wound shock is the phenomenon so convincingly demonstrated by Crile which follows injuries to sensory nerves. The exposure of the terminals of the sensory nerves of the skin over large areas and their irritation by the air, medicaments, or dressings, is responsible for unusual degrees of this form of shock in burns. Hence the mortality from primary wound shock is probably greater in burns than in any other form of traumatic wound. There is another cause of primary wound shock, unusual radiation of body heat, which the research committees of both the American and British armies found an almost constant factor in war wounds. The destruction of the skin and subcutaneous tissues removes the insulating covering from large areas of the body surface, and this is a definite factor in the production of primary wound shock in burns. The clinical symptoms of primary wound shock are those of apathetic shock, subnormal temperature, rapid soft running pulse, cold, clammy skin, cyanosis, dilated pupils, reacting slowly to light, half-closed sunken lusterless eyes, loss of control of sphincters. Death resulting from this condition usually occurs within the first three to six hours following the injury. As an immediate cause of death in burns we also have, as in all traumatic wounds, complete destruction of the part, fatal hemorrhage following the opening of or embolism following injury to the blood-vessels.

Secondary Toxic Wound Shock: If the patient survives the primary wound shock, great restlessness, excitement, or even delirium follows; this has been known clinically in the past as erethistic shock.

This condition is not peculiar to burns, but follows severe traumatic wounds of all kinds. That it is the result of a toxemia has been taught for some time. Stewart in the first edition of his Surgery in 1918 refers to it as a form of toxemia. The French military surgeons, however, experimentally produced this condition of secondary toxic wound shock by the injection of aseptic necrotic tissues produced by traumatism. Richards, working with the British War Research Committee, was able to produce the same symptoms with a chemical substance—histamin. Abel, of Johns Hopkins, claims to have isolated a chemical substance from aseptic necrosed traumatized tissues that he believes is histamin. Cornioley and Kotzareff *(Rev. de Chirurgie*, Paris, 1921, 59, N. 4, p. 233) have proved these toxic substances generated in aseptic crushed tissues circulate in the blood stream. By crossing the circulation of two rabbits they were able to obtain the symptoms of secondary toxic shock in the second uninjured animal when the first animal was traumatized.

Infection: The infection in most trau-

matic wounds is implanted by the traumatizing agent, the patient's clothes, or the dressings that may be applied. Clinical experience has shown that this develops in from eight to twenty-four hours after the receipt of the injury. Traumatic wounds produced by extremes of heat and cold are peculiar in that they are not caused by an infected or infecting agent. The temperature of the dry heat producing burns is frequently of such a degree as to absolutely destroy all bacteria in the skin and also in the overlying clothing. And yet of all types of traumatic wounds burns are more frequently infected than any other. If this is not implanted by the traumatizing agent or the overlying clothes it must be due to the septic character of the dressings that are applied. If you will recall the carron oil and the various ointments and other forms of primary dressings routinely used in hospitals, the least that you can say about them is that they are not aseptic, and we doubt if you could bring yourself to apply them to any other form of an open wound.

In order to divorce ourselves from the mysteries of the subject of burns, with its almost endless empirical medicaments and methods of treatment, we consider these injuries as traumatic wounds. We all should be in a position to apply to this type of traumatic wounds those principles now so universally accepted as the result of our war experience.

General Treatment.—The primary wound shock encountered during the first three hours following the injury is caused by the extreme pain of the exposed and irritated sensory nerve endings. This pain demands relief, which should be given by large doses of morphine. The irritation by the air of the exposed nerve endings should be lessened by covering them with a sterile or antiseptic oil, and the trauma of harsh dressings can be minimized by omitting them altogether or by impregnating the material with oil or wax. The usual radiation of body heat from burned surfaces is frequently as great a factor in this phenomenon of primary wound shock as is the pain. Though the "wax shell" of "ambrine" will act as an insulator over a burned surface, we feel that the danger from sealing a wound containing necrotic tissue far outweighs this advantage, especially when such radiation can be fully counteracted by placing the patient in an atmosphere of a temperature greater than that of normal body temperature. This will be referred to under local treatment.

The secondary wound shock is directly proportionate to the absorption of toxic substances from the mass of necrotic tissue. The absorption from necrosed tissues depends upon: (*a*) the total mass of dead and devitalized tissues; (*b*) the external drainage from this necrotic tissue; (*c*) the duration of time these necrotic tissues remain upon the surface of the wound. The earliest possible removal of this dead tissue is clearly indicated, and the brilliant results obtained by débridement in other types of traumatic wounds make one wish it were possible to practice this in burns, but the areas of destruction are usually so placed or so large that complete excision and primary closure, or even excision with secondary granulation, is usually impracticable. Nageotte-Wilbouchewitch (Th. de doct., Paris, g. Steinheil, 1893) advocated the rigorous mechanical cleansing of burns under general anesthesia and then the application of an adherent varnish. At the present time a few surgeons teach this radical procedure. We, however, have never employed it and feel that it certainly is unjustifiable during the period of shock in which most of our patients come to the hospital. We have been content with the application of weak antiseptic oils to these necrotic tissues during the period of shock. At the end of twenty-four hours we begin to remove all loose and detached tissues with scissors and hasten natural autolysis by immersing the part or patient for one hour each day in a bath of 2-per-cent aqueous solution of sodium bicarbonate. This also will be discussed in detail when describing the local treatment. Our clinical experi-

ence has convinced us that impervious dressings which prevent external drainage from these necrotic surfaces and hence increase absorption of toxic substances cannot be too strongly condemned. This condemnation includes the surgical lint upon which ointments are usually spread as well as the so-called "wax shell" of ambrine or any of its substitutes. With our present knowledge of the pathology of wound infection no surgeon would deliberately close any other type of traumatic wound containing necrotic tissues or infection, and it is no more justifiable to do so in traumatic wounds produced by extremes of heat or cold. We are firmly convinced that many of the fatalities following the routine use of impervious dressings, instead of being inevitable, have been the result of secondary toxic wound shock or prolonged absorption from infected and suppurating necrotic tissues that is preventable. The fact that during the last three years we have not had one death from infection or suppuration in our group of burns is the basis of this conviction. As the questions of infection and suppuration are directly dependent upon the local treatment of the burned surfaces they will be considered under this heading.

Local Treatment.—The process of repair of burns must follow the same laws that apply to the repair of all traumatic wounds. Thus the rate of repair will be directly dependent upon (*a*) the amount of tissues destroyed by the original traumatizing agent; (*b*) the type, degree and duration of the infection.

The local treatment of all traumatic wounds is now based upon: (*a*) the time intervening after receipt of the injury; (*b*) the type and content of bacteria; (*c*) the mass of dead and devitalized tissues which they contain. We have consistently grouped our burns as other surgeons have classified their traumatic wounds.

1. Non-infected.
2. Contaminated.
3. Infected.
4. Suppurating.

1. The non-infected group include burns of the first degree and those of the second degree in which the blisters are unbroken. In this type of burn primary closure and prevention of secondary infection is clearly indicated. The air-tight occlusive dressing provided by the paraffin film may be regarded as a primary closure of the wound. Both Sanford and Rothchild in reporting their results have used Dupuytren's classification, in which the second and third degree burns are comparable to the first and second degrees of the classification used in America; this at first glance makes their results appear unusual. Many of their cases belong to this non-infected group and to the second type of contaminated burns.

2. Burns which can be treated within the first three hours after injury and in which it is possible to entirely remove the dead or devitalized tissue by mechanical means are classified as contaminated. Broken blisters and possibly small areas of superficial localized necrosis represent the limit of dead tissue which we have removed by mechanical measures. We feel it justifiable to attempt the primary closure of this class of burns with the paraffin film, provided that a microscopic examination of the exudate does not show the presence of streptococci. With the first signs of infection, general or local, the occlusive dressing must be removed and the burn treated as an infected wound.

3. Burns of the third degree are classified as infected from the twelfth to the twenty-fourth hour, and as suppurating seventy-two hours after the receipt of the injury. No occlusive dressings are ever applied over infected or suppurating burns until all the devitalized tissues are removed and surgical sterility of the surfaces has been obtained.

To obtain surgical sterility of a burned surface is not the same problem as in other infected traumatic wounds. The total excision of the involved tissues and the immediate suture, though ideal, are mechanically impossible except when very small areas are involved. The chemical débride-

ment of the wound with Dakin's solution, which has been so satisfactory with other types of traumatic wounds, has not been possible in the majority of our cases because of the pain that it produces when applied to the sensitive surfaces. Hartwel in 1917 suggested the use of 2-per-cent solution of acetic acid as a proteolytic agent for the removal of necrotic tissue from burned surfaces. The clinical results which he exhibited at the Bellevue Hospital are comparable to those we have obtained, but as yet we have not employed it. In a large proportion of cases in which it has not been possible to use Dakin's solution we have depended upon natural autolysis supplemented by mechanical cleansing. A daily immersion for a period of one hour in a 2-per-cent watery solution of sodium bicarbonate at a temperature of 102° F. softens and mechanically drains the secretions from the surface of the body and at the same time counteracts the acidity of the acrid secretions which are so irritating to these sensitive surfaces. The surfaces then are exposed to heated air for the rest of the twenty-four hours. When the trunk is involved or large areas of the extremities are denuded of skin undue radiation of body heat is guarded against by covering the patient with a blanket tent made over the bed under which a constant temperature of 98° to 100° F. is maintained by electric lights. The application of a single layer of paraffined wide-mesh gauze to the burned surface will permit of adequate drainage from the wound, and this dressing will painlessly float from the burned area at the time of the daily immersion in the solution of sodium bicarbonate. With it will come the inspissated exudate which has collected on its outer surface. This constitutes a distinct advantage over the original open-air treatment of burns in which scabs were allowed to form composed of dried exudate and under which infection and suppuration usually occurred and was retained.

Concurrent with the removal of devitalized tissues there is a lowering of the bacterial content, but rarely can the sterility be obtained that is necessary to justify a secondary closure with the paraffin film, or to guarantee the best results from skin-grafting without the use of an antiseptic. As an antiseptic for burns we have not felt that Dakin's hypochlorite solution was indicated. The germicidal chloramines have been preferred. To many individuals all the chlorine antiseptics are painful, and the utmost care is necessary to insure their purity and freedom from active chlorine, and in the case of dichloramine, hydrochloric acid. We start with solutions of dichloramine-T as weak as 1/40 of one per cent, gradually increasing them to 1/2 of one per cent. In order to avoid hydrochloric acid in the stock solution it should be freshly prepared daily, or one drachm of powdered sodium bicarbonate should be added to each 2 ounces of the dichloramine solution to automatically take up the hydrochloric acid as it is formed.

The early claims for the almost impossible regeneration following the use of paraffin films have proved to be somewhat exaggerated and not always trustworthy. There is no doubt, however, a greater degree of skin regeneration occurs than most surgeons have been accustomed to obtain with the empiric methods of the past, but the necessity for skin-grafting still exists in a large proportion of burns of the third degree. As in all traumatic wounds the best results are obtained on surfaces which have reached the condition of surgical sterility in the shortest period of time.

SUMMARY.

1. As burns differ widely in degree, character of tissue destruction, bacterial content, and progress of healing, no one procedure as a local measure—wet or dry dressings, wax or ointments—or no one solution, will prove equally valuable for all cases and all stages.

2. The same factors, infection and necrotic tissues, are present in burns as in all

traumatic wounds, and therefore the same principles apply to their treatment as have been found of such practical value in the treatment of traumatic wounds.

3. The covering of burns with impervious dressings, such as wax films, is to a certain extent comparable to the surgical closure of traumatic wounds, and should be governed by the time elapsing after the accident, the type of infection, the bacterial content, and the presence of necrotic tissue.

4. The débridement of burns by surgical excision, though theoretically ideal, is usually a mechanical impossibility. Dakin's solution, when it can be borne by the patient, chemically removes the necrotic tissue of burns in the same satisfactory manner as in traumatic wounds, but, unfortunately, only a small proportion of patients will endure the pain caused by its application to such hypersensitive surfaces.

In the majority of our cases we have had to be content with natural tissue autolysis assisted by the mechanical cleansing and the daily immersion in a 2-per-cent sodium bicarbonate solution.

5. Until the condition of surgical sterility is obtained we have found that a single layer of wide-mesh paraffin gauze and the exposure of the part to the air provide the necessary drainage and a dressing that will float off the wound with minimal trauma at the time of daily immersion.

6. It is usually necessary to employ a chemical antiseptic to obtain and maintain surgical sterility of burned surfaces if they are exposed to the air. The chlorine group has been the most satisfactory in our experience. However, unusual care must be taken in their preparation, and they must be tested to avoid the application of irritating free chlorine or hydrochloric acid in using dichloramine-T. Very weak strengths should be used at first, as weak as 1/40 of 1 per cent; as the patient becomes accustomed to the antiseptic it may be gradually increased to 1/2 of 1 per cent.

7. The covering of burned surfaces when surgically sterile with wax films will maintain their sterility and thus provide the best conditions for the growth of new skin.

8. The rate of growth of new skin and of grafted skin is at the maximum upon surfaces which have reached the condition of sterility in the shortest interval of time.

9. The amount of scar tissue formed after burns and the consequent contractures are in direct proportion to the amount of tissue destroyed by the original traumatizing agent and the type, degree, and duration of the infection.

Preparation of the Paraffined Fly-netting Used as a Dressing for Burns.—A good quality of fly-netting with a 3/32-inch mesh has been found the most practicable. As purchased it is stiffened or "sized," and this is a decided advantage, for if the starch or sizing is removed by washing the thread will absorb too much of the paraffin and the mesh will be filled with wax and thus prevent drainage. The netting is cut into strips, 4 x 6 inches being a convenient size, and 10 pieces are placed in muslin wrappers and made into a package as is customary with gauze sponges. These packages are then sterilized in the usual way by steam under 15 pounds pressure. Paraffin wax, melting at 45° F., is melted on a water-bath in a flat agate tray. The tray should be about half-filled with the melted paraffin. When the wax is thoroughly melted the previously sterilized fly-netting, grasped at the two corners of one end by two sterile thumb forceps, is slowly drawn through the melted wax. The threads absorb the required amount of paraffin in about a half-minute, and then the strip is held vertically, by means of the same forceps, over the hot surface of the melted paraffin until the excess of the wax has drained away and the mesh is everywhere open. The strip is then moved away from the hot tray and held for a few seconds in the air to cool, after which it is placed, in piles of 10, in sterile muslin wrappers as previously described.

Diagnosis of Pulmonary Tuberculosis in Adults[1]

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After a moderately extensive experience in taking the history and making the initial physical examination of patients admitted to the State Sanatorium for Tuberculosis at Mont Alto, Pennsylvania, and later at Hamburg, the writer is convinced that, through delayed treatment, there is an appalling loss of life, health, and man power. The reasons are multiple.

In a percentage of cases the disease develops insidiously. Frequently a cigarette smoker, a poor observer, has a cough and sputum which he attributes to his smoking, and fails to notice the decline in endurance, strength and weight till he has lost 10, 15 or 20 pounds. He continues at his occupation till his condition unfits him for work, or he may develop an attack of fever, chills and sweats, a hemorrhage or a pleurisy which compel him to consult a physician.

There is another class of patient who is aware of a failure in health, but is not willing to go to a doctor because he is sure he will not be allowed to go to work and probably will be put to bed. He continues at his work until he can go no longer.

It is sad but true that some patients with apparent justice do not speak well of their physician. He had always rendered an agreeable and efficient service, but in this instance he failed to satisfy the patient because he did not make an examination, did not make a correct diagnosis, or did not clearly tell the patient of his condition, and did not establish suitable treatment. In the long run the only thing that will satisfy the patient and his friends is a thorough examination, a correct diagnosis, and rational treatment. Years ago the writer examined a young man, told him and his mother that he had pulmonary tuberculosis, and advised sanatorium treatment at once. That did not suit the mother. She took her son to another physician, who did not examine the chest, but assured her that he would soon be well. He became worse. She consulted another physician, who assured her that her son had "stomach trouble" and that he would be well in three weeks. In three weeks he was much worse; his mother took him to a well-known tuberculosis specialist in Philadelphia, and the young man spent that night in a private tuberculosis sanatorium. She could not permanently meet the expense and returned to me and remained my grateful, loyal patient, till years later I left the town. People do not like to be told that the trouble is tuberculosis, but after they get possession of themselves they are appreciative of the service. It is a sad experience to hear a patient narrate his disappointment in his physician who is charged with not having made an examination or a careless one, did not make a correct diagnosis, or did not make the patient aware of his condition and command his coöperation.

The time to make the diagnosis is in the early stage of the disease. With rational treatment about 90 per cent of the early cases can be restored to health and a life of usefulness. But the diagnosis at that stage is difficult. The examination of a patient for early or late tuberculosis is a time and patience consuming process. Taking the history and making the initial physical examination with record consumes per patient on an average one hour. That does not include the taking of the blood-pressure, the examination of urine, sputum, and that by the *x*-ray. By not making a record the time can be reduced, but it is still a long examination.

History: When a patient consults a physician for illness associated with a cough

[1]This article was written at the suggestion of Colonel Edward Martin, M.D., Commissioner of Health of Pennsylvania, and approved by his successor, Dr. Charles H. Miner.

of a few weeks' duration, the doctor should obtain the history of the evolution of the condition complained of, his previous attacks of illness, his general health, occupation, vigor, and the family history. The evolution of the development of the condition associated with the cough is of vital importance.

The early manifestation of pulmonary tuberculosis is protean. It may be thoroughly insidious, dry hacking cough, later an appreciable loss of endurance followed by loss of weight and strength, the presence of sputum, fever, and sweats. A good observer will consult a physician early, but a poor one will permit serious delay. However, such a history should put a doctor on the right track.

In some patients the development is in the form of another disease. Typhoid fever is simulated at times by pulmonary tuberculosis, so that the real condition is not suspected till the fever fails to subside.

In malarial districts errors in diagnosis may be made by the disease first becoming manifest by fever with periodic chills and sweats.

The onset occasionally has the chill, fever and pleurisy so characteristic of pneumonia. The error may not be detected till the manifestation does not run true to form, and it may then be possible to find tubercle bacilli in the sputum.

When a case of supposed pneumonia expectorates fluid blood, the real condition is ordinarily tuberculosis. The condition is so severe that the patient generally quickly dies.

Several patients gave a history of having good health till an attack of the grip—pains, aches, fever, sweats, chills, cough, expectoration, and prostration. The recovery was slow and only partial, and in some cases was followed by hemorrhage, pleurisy, or both.

Some patients have cough, expectoration, loss of weight, strength, and endurance, while they complain of nausea and vomiting or abdominal pain.

Recently the writer became acquainted with a man who two years ago complained of fatigue about 4 P.M. In a short time a dry cough appeared, and that was soon followed by indefinite gastroenteric symptoms. For fifteen months he was treated by a stomach specialist, but became constantly worse. He consulted a surgeon with the purpose of having his appendix removed. The surgeon with rugged honesty told him that he did not advise appendectomy; that he did not know what disease he had, but he suspected tuberculosis, and sent him to a physician, who made a diagnosis of pulmonary tuberculosis. He is in the far advanced stage, a permanent bed patient, with a cavity as large as his fist in the right upper lobe.

Danger-signals: The early development of tuberculosis of the lungs is often announced by danger-signals—hemorrhage, pleurisy, ischiorectal abscess, repeated colds, and exposure to pulmonary tuberculosis in other people, especially members of the family.

Hemorrhage: Hemoptysis and hematemesis are ordinarily readily distinguished. In the first the blood is bright-red, associated with cough and expectoration, mixed with sputum, and in small amounts is frothy; while the latter is dark in color, acid, vomited and mixed with food.

Bleeding from nose, pharynx, gums or tongue can be seen by local examination.

Cardiac disease, especially mitral stenosis, is responsible for many cases of pulmonary hemorrhage. In the process of exclusion the heart is to be considered first.

Pulmonary abscess and gangrene, bronchiectasis, chronic bronchitis and emphysema, pneumonokoniosis, ulcers of the bronchial tree and larynx and actinomycosis are responsible for part of the pulmonary hemorrhages. In all those conditions there is a definite lesion and the patient is ill. The diagnosis in some of those conditions is not easily made, but it is well to remember that there are such conditions.

When all of the above sources have been excluded only part of the hemorrhages have gone with them. About 60 per cent of all

hemorrhages from the lungs are tuberculous. Hemorrhage may be the danger-signal announcing the successful attack of the tubercle bacillus on the lung; it may appear at any stage in the battle and it may close the conflict. Of 522 patients in this institution whose records were taken, 269 had hemorrhage, large or small, single or multiple, during the course of the disease. Of far greater moment to the patient and practitioner is the fact that 97 had a hemorrhage of a drachm or more while they were apparently in good health. There is the danger-signal. A physician makes but few mistakes in diagnosis when he calls all pulmonary hemorrhages of a drachm or more in an apparently healthy person tuberculosis. If those 97 patients had had rational treatment for pulmonary tuberculosis immediately following the hemorrhage, practically all of them would have made a good, prompt recovery. Perhaps not one would have passed the earliest stage of the disease.

Pleurisy: Pleurisies are classed as primary or idiopathic and secondary. The latter are part of another disease. It is a part of pneumonia, gangrene and abscess of the lung, influenza, certain septic conditions, carcinoma, and sarcoma. Every case of pulmonary tuberculosis has pleurisy during the progress of the disease.

Pleurisy as a danger-signal deals only with a primary or idiopathic form. These are not associated with an apparent disease. They are due to cold. The pleurisy may last a few days, a few weeks, or months. The exudate may be fibrinous, serofibrinous, or purulent. Before the development of manifest pulmonary tuberculosis there were in our list of 522 patients, 123 who had dry or fibrinous, 10 serofibrinous, and three purulent pleurisy. These 136 people while they were apparently well developed pleurisy, which was a danger-signal of the approaching storm of pulmonary tuberculosis. Had those people received proper treatment when they had the primary pleurisy and later, nearly all of them would have escaped the storm.

Of the pleurisies due to cold Landouzy believes 98 per cent are tuberculous. Barker states that 80 per cent of all the serofibrinous pleurisies are tuberculous. The remaining 20 per cent are probably all secondary. Probably not more than 20 per cent of empyemas are tuberculous; many of the 20 per cent are primary. The more insidious the wet pleurisy is, the more certain it is to be tuberculous.

From 30 to 75 per cent of primary dry pleurisy patients develop pulmonary tuberculosis within five years. Patients with primary pleurisy treated as if they had tuberculosis rarely develop pulmonary tuberculosis. The conviction is growing that there are no primary pleurisies; they are all tuberculous. If all patients with primary pleurisy are treated as if they had tuberculosis there will be a large reduction of cases of pulmonary tuberculosis. Every case of primary pleurisy is a danger-signal.

Ischiorectal Abscess: In our list of 522 cases 17 developed an ischiorectal abscess before and 19 during the manifest pulmonary tuberculosis. Surgeons are not in accord as to the number of the cases that are tuberculous, but surely there are enough of them due to the tubercle bacillus that it is the part of wisdom to regard ischiorectal abscess as a danger-signal and treat it and the patient for tuberculosis.

Repeated Colds: Before the development of the manifest pulmonary tuberculosis in our 522 cases, 228 gave a history of repeated colds. The constant repetition of colds is not only an annoyance to the patient, but it is a real signal of danger ahead.

Exposure to Tuberculosis: Of our list of 522 cases, 130 gave a history of exposure to tuberculosis. It was generally in the home and due to a member of the family. In many of the cases there was no effort made by the family or physician to regard all the members of the household as potential cases of pulmonary tuberculosis. Many of these cases passed through the first stage into the second or even into the far advanced stage before rational treatment was instituted. Exposure of that

kind should be regarded as a danger-signal, and when any untoward breeze arises it should be regarded as the beginning of the storm.

In our list of 522 patients 139 did not have, before the manifest development of pulmonary tuberculosis, either hemorrhage, primary pleurisy, ischiorectal abscess, exposure to tuberculosis, or repeated colds; while 216 had one of these five before the manifest development of pulmonary tuberculosis; 119 had two; 39 had three; and 9 had four of them.

Approximately 27 per cent had none of these danger-signals, and 73 per cent had one, two, three, or four. Had those 383 persons been treated rationally for a tuberculous condition, few if any of them would have developed serious pulmonary tuberculosis.

No other part of the examination gives information for the prevention of pulmonary tuberculosis as does the history.

CONSTITUTIONAL MANIFESTATIONS.

Loss of Endurance.—Frequently the first occasion for complaint in a hard-working person is that he becomes fatigued before the day's work is done. A coal miner once said that the first thing he noticed was that by night he was too tired to walk home. Years ago a woman with one son dead from tuberculosis of the lungs and brain and another ill with pulmonary tuberculosis in a sanatorium, sought medical advice because her work was producing fatigue before the close of the day. She was well in other respects, she said, but felt that she needed a tonic. Notwithstanding the fact that she denied having a cough, she frequently gave a demonstration of a dry hack. Her temperature then in the afternoon was 99.4° F. and her pulse was 92. There was nothing to prove that she had lost weight or strength. Physical examination did not add anything. A diagnosis of pulmonary tuberculosis was made, and she was advised to go to a sanatorium. She felt that she could not and did not go. Later sputum appeared and in it tubercle bacilli. Bad was succeeded by worse. She was sent by friends to South Carolina, and the last heard from her was a letter asking a favor, in which she stated she was very ill, confined to bed.

Malaise.—Occasionally a young person develops a state of physical worthlessness. He goes to bed exhausted, arises in the morning tired, and everything that he does adds to his fatigue. Physical effort should be avoided, and temperature, pulse, cough, weight and strength should be observed. The possibility of tuberculosis must not escape attention.

Fever is a factor in the history of every case of pulmonary tuberculosis, especially during the stage of physical activity. In the late stage the fever generally is due in part to the mixed infection. For diagnostic purposes the temperature should be taken frequently in the day to determine its range.

A temperature above normal a part of the day and below normal part of the day should make the physician be alert for other manifestations of tuberculosis.

Cough is practically always present during active pulmonary tuberculosis. Cough, fever, sweats and chills are not infrequently the first manifestation of the trouble. When the patient does not make prompt recovery and the cough persists three or four weeks, the doctor should be in search of tuberculosis.

Gastric disturbances have too frequently led physicians on a wrong trail. Loss of weight and strength are common and occur generally early in the development of tuberculosis.

Physical Examination.—The patient facing a good light should be comfortably seated on a stool high enough for the convenience of the examiner. The position on the stool should be easy and comfortable, not rigid or slouching. The chest should be free from clothing. For women a substantial piece of washable cloth 12 by 8 inches with a tape attached to the upper corners of the length can be fastened and placed over the breasts.

Chests vary in form from the long, nar-

row, to the barrel shape. Some are broad, flat, and shallow. A funnel-shaped depression not often appears in the lower part of the sternum, and the chicken-breasted chest appears occasionally. In the small narrow chest with curved shoulders the angle of the scapula projects from the chest wall, giving origin to the variety called alar or winged chest. These forms have no significance in the diagnosis of pulmonary tuberculosis. The well-formed chest is the most desirable.

The location of the lesion in incipient cases of tuberculosis of the lung is generally at the apex in the proportion of about three at the right to two at the left. It may be found on either side above the scapular spine, above the clavicle or close below it. The writer's experience is that one case in about five hundred develops in the lower lobe. That is negligible. When the initial lesion is deep in the substance of the lung it cannot be found by ordinary physical examination.

Inspection is by many classed as rather insignificant, but in the physical examination of a chest for tuberculosis it ranks a close second to auscultation. Frequently inspection shows the location of the lesion and gives a good idea of its extent. View the front, sides and back, top and bottom.

Occupation may cause one shoulder to be lower than the other, but frequently the shoulder of the affected side is the lower, and the line of the surface from the tip of the shoulder to the neck on the diseased side is less curved.

The clavicles in well-nourished women show slightly or not at all, while in men of the same grade of nutrition the clavicle shows in part. In early tuberculous invasion of the apex there may be appreciable flattening below the clavicle. Later the flattening is more marked.

Diminution in the expansion of the apex of a diseased lung is so common, but slight and easily overlooked, that the importance of its recognition is momentous. Some regard this phenonmeon as due to toxic influence; others, as due to obstruction of the bronchioles caused by swelling of the surrounding tissues; while others regard it as due to nature's purpose to keep the diseased lung at rest. That view appears to be confirmed by the fact that the fluoroscope shows that the excursion of the diaphragm of the diseased side is reduced. That means that the expansion of the whole lung is reduced.

Several methods of determining abnormality of expansion at the apex or apices are used. Some are by inspection and some are by palpation. All will be presented under this head.

1. The patient is seated directly in front of a good light, and the examiner is a few feet toward the light so as to obtain a good perspective. The patient is directed to breathe easily, normally, and moderately deeply. It is usually necessary to show the patient how to breathe. Some patients are inclined to pull up the shoulders. That spoils it. While the patient is breathing easily and deeply the examiner observes which side starts to expand first and which expands the more. By directing the vision below the outer part of the clavicles the diseased side will be observed not to distend as does the other. The expansion normally starts at the top of the chest and progresses rhythmically downward. When the entire chest wall rises synchronously there is retardation at the apex, also diminished expansion.

2. By placing the hands vertically on corresponding parts of the chest with the finger-tips below the outer part of the clavicle, the difference in expansion of the two sides and the degree of retardation can be appreciated.

3. By standing behind the patient with the eyes on a level with the shoulders, retardation and reduction of expansion can be visually estimated.

4. With the patient seated low enough so that the observer can see a little of the surface of the chest beyond the clavicles, the examiner is able to see advantageously the time and degree of rise and fall of the chest. By placing a mark at corresponding

points on the chest below the clavicles, the doctor's eye will easily perceive which chest expands the more and the earlier.

5. If the examiner places the hands on corresponding parts of the top of the chest with the finger-tips in the supraclavicular notch and the palm above the spine of the scapula, he can both see and feel the difference in expansion.

6. Another method is to place the thumbs on the back of the neck, the palms on and above the clavicle, and the fingers on the chest below. Again he can feel and see the expansion.

If the examiner, standing at the right of the patient, places his left ring-finger on the second rib below the middle of the clavicle, the index-finger on the fourth rib on the anterior axillary line, and the middle finger in a comfortable position on the third rib, and directs the patient to breathe moderately deeply and rapidly, the expansion of the chest is imparted to the fingers so that it can be seen and felt. The normal expansion travels downward, but if the fingers rise synchronously there is retarded and diminished expansion at the apex. The right apex can be tested by the right fingers similarly placed.

Pottenger, in early diagnosis, accentuates the fact that the muscles of the shoulder girdle are tense and reduce the size of the upper part of the diseased chest. By light, delicate palpation, the difference in the muscular tension of the two apices can be felt.

Mensuration shows that the chest with the diseased apex does not expand so freely as does the other. Percussion of the basal margins and the fluoroscope show that its diaphragm has reduced motion. In short, the breathing of a lung with a small lesion at the apex is throughout reduced. The breathing is feeble.

Percussion.—There is no standard for the normal percussion note of the lung. The size and shape vary; some walls are thin, while others are thick; some are muscular and others are not. All these things affect the tone and so does the tension of the wall. Pottenger believes that the change in the apical sound in early tuberculosis is not so much, if at all, from the infiltration of the lung by tubercles as it is the state of muscular tension. The right normal apex is somewhat smaller than the left, and on percussion gives a higher, shorter and less resonant sound. A slight difference in favor of the right side is to be ignored, but a corresponding change in the sounds at the left apex is significant.

The deposit of tubercles in an apex reduces its function and size. By outlining Krönig's isthmus the amount of involvement of the apex can at least be suspected. The older and more involved the apex becomes, the narrower is the isthmus. Delicate percussion from the neck downward toward the shoulder will give the inner limit of resonance of the isthmus, and in the opposite direction will give the outer margin.

The superficial initial location of pulmonary tuberculosis is so generally between the spine of the scapula and the second rib anteriorly that this region is to be lightly percussed. The change in the tone is that the sound becomes shorter, higher pitched, and less resonant. However, the whole lung is to be percussed every time.

Auscultation is reputed to give us the most valuable information in pulmonary diagnosis, and that belief is justified, but it requires a trained ear. Authorities differ as to the stethoscope to be used. It is well to have a familiar working knowledge of several, and the one that gives the best transmission of the sound to the individual ear is the instrument to use.

The diagnostic phenomenon of greatest value obtained by auscultation in early pulmonary tuberculosis is finding râles at the apex. The râles are found almost exclusively between the spine of the scapula and second rib in front. In the early stage of pulmonary tuberculosis ordinary breathing or even moderately deep breathing will not develop râles. When râles at the apex are heard during ordinary inspiration the process has passed the first stage. The best

way to develop the small, fine râles of the early stage as well as the larger râles of the later stages is to have the patient expire partially, give an easy, short, quick, sharp, moderate cough, followed immediately by a moderately deep inspiration and partial expiration. It is well to allow the patient to retain enough air in the lung following expiration to give the succeeding cough with ease and comfort. The râles are occasionally heard at the end of the cough, but generally during inspiration. Too hard, too loud or too prolonged a cough may interfere with hearing the râles.

Granular Breathing. Hearing the fine apical râles is the most constant and valuable diagnostic sign obtained by auscultation, but it is not the earliest. Granular breathing is the first audible manifestation of apical tuberculosis. By the formation of tubercles in the lung tissue some of the air cells are compressed, some become distended or emphysematous, while others remain normal. During inspiration these cells do not fill regularly in time, volume, or force, thus producing rough, sputtering inspiration—a rapid succession of minute explosions; or it appears that râles are about to form, but before they appear inspiration ceases. This is rather rarely heard.

Feeble Breathing. It has already been shown that not only the diseased apex has diminished expansion in early pulmonary tuberculosis, but also that the condition obtains throughout the entire lung. Auscultation shows a corresponding feeble breathing. It is significant.

Cog-wheel Breathing. Ordinarily the inspiratory sound is smooth and even, but occasionally it is interrupted, wavy, or jerky. This cog-wheel sound occurs in tuberculosis, but it also occurs when the patient is chilly, nervous, or where severe pain is produced by motion of the chest wall.

Vesicobronchial or Bronchovesicular Breathing. Some physicians indicate the slight prolongation of the expiratory murmur as vesicobronchial breathing and the more marked prolongation as bronchovesicular, while others express all degrees of prolongation with high pitch as bronchovesicular. Prolonged expiration with high pitch at the left apex is significant, but the same sound when slight, heard at the right apex, should receive doubtful consideration. As the infiltration advances the second sound becomes more prolonged and high-pitched. Consequently the more prolonged and high-pitched the expiratory sound becomes the more significance is to be attached to it.

Since this paper is prepared especially for those practitioners who are not habitually examining chests, perhaps it is well to indicate where the sounds indicative of pathological processes can be found in a normal body. The writer frequently has occasion to compare the sounds he hears with those known to be normal. The best way to learn sounds is to hear them.

Bronchial Breathing. By placing the stethoscope over the seventh cervical spinous process or by the side of the processes as low as the fifth thoracic vertebra, pure bronchial breathing can be heard.

Bronchovesicular. Between the scapulæ all grades of modification of the bronchial sound, due to its passing through a more or less thick layer of vesicular tissue, can be heard. Where the layer of air cells is thick the sound approaches the vesicular or vesiculobronchial breathing, but where the layer is thin the sound approaches bronchial or bronchovesicular breathing.

Cavernous breathing may be heard by placing the stethoscope over the spinal column below the skull or above the zygomatic arch while the person breathes deeply. The sound is similar to that heard over a cavity of moderate size.

As the tuberculous process advances new lung tissue becomes involved, and the infiltration passes eventually to consolidation and from lobe to lobe. Before death usually all the lobes are tuberculous, and often there remains but a small area of air-breathing lung. During the onward march of the tuberculous process the chest

diminishes in size, the clavicles and scapulæ become more prominent, expansion diminishes markedly, mostly at the apices; the voice is felt and heard more clearly; dulness increases in degree and extent; the breath sounds over increasing areas may be changed from vesicular to bronchovesicular through various grades to bronchial; râles are heard more extensively and are more moist. The softening process is a distance in the rear of the infiltration, but it usually causes the small areas of destruction to unite into recognizable cavities.

Cavities.—An empty cavity close to the pleura is ordinarily recognizable, but one filled with thick exudate or located in the interior of the lung with a surrounding layer of air-containing tissue is not ordinarily discovered. But cavities are generally close to the pleura and empty. Bubbling râles between the clavicle and spine of the scapula justify a diagnosis of cavitation because there is no large branch of the bronchial tree in that region. Usually the diagnosis of cavity is made by cavernous breathing, whispered pectoriloquy, and the crashing sound produced in the ear when the patient coughs. The last is most diagnostic.

The location of pulmonary cavitation is significant. A cavity in the upper lobe justifies a diagnosis of tuberculosis, but a cavity in the lower lobe without well established tuberculosis in other parts of the lung justifies a diagnosis of non-tuberculous origin. The only time that a cavity in the lower lobe without clear evidence of tuberculous lesions in other parts of the lung is justifiable is the exceedingly rare case which has tubercle bacilli in the sputum. A lower lobe cavity without absolute proof of tuberculosis demands that it be considered non-tuberculous.

Laboratory.—This patient had a hemorrhage followed by cough, sputum, fever, chills, sweats, loss of endurance, weight and strength, diminished expansion and retraction of upper chest, and apical râles. A diagnosis of pulmonary tuberculosis is justly made. Failure to make that diagnosis would be criminal carelessness or an appalling ignorance. But the diagnosis has not been proven. One thing more is necessary to prove that it is tuberculosis—the finding of the tubercle bacilli in reasonable numbers in the sputum. However it is not necessary or justifiable to delay diagnosis and treatment until the tubercle bacilli are found in the sputum. The patient's chance for recovery is endangered by delay. If the patient is seen by the doctor the diagnosis and treatment are best when they are established before the tubercle bacilli begin to escape from the lung. Too many of us await the report from the laboratory to give us backbone enough to make a diagnosis.

The laboratory has justified its claim to being an aid not only in diagnosis but also in prognosis and treatment. The finding of the tubercle bacilli in reasonable numbers in the sputum places the diagnosis in the domain of the absolutely proven. However the laboratory work is not beyond the possibility of errors. These are some of them:

1. The patient may have sent material which was not from the diseased portion of the lungs, as nasopharyngeal mucus or muco-pus.

2. The specimens may become mixed. A small amount of carelessness will accomplish that.

3. The wrong portion of the specimen may be used in smearing the slide. The most purulent part of the sputum should be used. The portion of pus lining a cavity contains the most tubercle bacilli.

4. The stain may be defective and the tubercle bacilli, though present, cannot be found.

5. The microscopist through lack of skill or vigilance may not find tubercle bacilli when they are present, or perhaps worse, reports that they are present when they are not. This incident is an actual occurrence. The laboratory report had been sent—tubercle bacilli negative—but when the operator learned that the patient was pale, thin, and feeble, expressed regret that he

did not know that before he had sent the report.

A laboratory report is worth just what the individual doing the work is worth; some are bad and some indifferent—generally excellent.

When tubercle bacilli are not found, that fact has slight significance. Repeated absence of T. B. deserves sufficient consideration to bring the whole question of diagnosis forth for renewed study. Our laboratory routine requires ten negatives before they are regarded as significant evidence, but the ten negatives are not nearly the equivalent of one positive.

The tubercle bacilli are necessarily negative in certain grave tuberculous conditions, as acute miliary tuberculosis, tuberculous meningitis, and they are not found in the stage of pulmonary tuberculosis before softening of the tubercle occurs and the discharge of the softened mass as sputum.

This is the laboratory era in medicine, and it does seem reasonable to suppose that it will, throughout time, remain the golden age of medicine. It scarcely seems possible that another fifty years will add so much to the human grasp of medicine as has the present. It is a glorious period in which to live: a rare opportunity to see knowledge grow and progress evolve. But it has its limitations, its defects.

There is a tendency on the part of some practitioners to have the laboratory make the diagnosis. That it cannot do and should not be asked to do. The family doctor should take the history, make a thorough physical examination, and use the laboratory as an aid and confirmation of his findings. In that way the laboratory is a stimulus and incentive to improve the study of his patients. But the practitioner who leaves the diagnosis to the laboratory has ceased to work or think, and the declining years of his life have begun.

The diagnosis of disease consists of two parts: one to collect the facts, and the other is a reasoning process to determine what those facts show. The laboratory is to furnish data, and a good laboratory does that well, but it is the function of the physician in charge of the patient to acquire all the facts and make the diagnosis.

The effort at extermination of tuberculosis has a discouraging phase. The tuberculous patients are treated more and more in sanatoria. That is as it should be. The sanatorium is the keystone in the arch of the effort to exterminate tuberculosis, but the family practitioner is having reduced opportunity to study tuberculosis, and he is therefore less fit to make an early diagnosis. Experience shows that the success of the work depends in part on early diagnosis and treatment. In short the demand for effective work calls to the family physician for early diagnosis and treatment, while his opportunity to see and study cases of tuberculosis is diminishing. It is following in the trail of smallpox, and it does seem reasonable that the physician who knows that he is unfit to make an early diagnosis of tuberculosis by reason of his lack of experience should be urged to seek a trained consultant for all his suspicious cases or send them to an institution for observation. So long as patients in large numbers are reaching the far-advanced stage of pulmonary tuberculosis before diagnosis and treatment are established, so long will there be a succeeding crop of the same trouble.

X-ray.—The public has the greatest faith in the *x*-ray. To many it is the last word in diagnosis. Many of the profession appear to regard it in the same way. Some do not attempt to make an examination, but send the patient for an *x*-ray examination. In doing that the physician has committed two errors. He has impressed the patient with the fact that the history and physical examination of the chest are not necessary, or worse, that he is not fit to do it and thereby loses control of his patient. The other error is that the *x*-ray examination by an operator with ordinary training without a good history and physical examination is not worthy of great confidence. When used aright the fluoro-

scope and plate are studies of great value. The natural and proper order of procedure is that the physician take a careful history and make a complete examination, and if he then feels that he needs further study of the case he should send the patient for *x*-ray examination, with his findings and instruction as to the things he wants elucidated, and the report of findings by the fluoroscope and plate with their interpretation should be returned to the physician for additional study and entire treatment. It is not the function of the roentgenologist to make the diagnosis. When a patient wants an *x*-ray examination, the physician should send him to the roentgenologist of his choice with due instruction and receive the report. The practitioner and the roentgenologist should be reciprocally helpful. Each needs the other and the patient is the beneficiary.

In addition the *x*-ray offers an enormous opportunity for the study of living pathology, and the general practitioner should avail himself of every opportunity to see disease as it is thus visualized.

SUMMARY.

Early diagnosis of pulmonary tuberculosis makes early treatment possible, and appropriate treatment in the early stage means that about 90 per cent will make a good recovery.

Diagnosis is the function of the practitioner, and he should use every means to obtain facts and assistance—history, physical diagnosis, consultants, laboratory, and *x*-ray. Nothing should be eliminated which is necessary to make the diagnosis early.

The Ambulant Treatment of Anorectal Fistula[1]

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By the above title we mean the treatment of certain types of anorectal fistula by recognized and accepted surgical means in such a way that the patient can pursue his ordinary vocation during the period of treatment. We say recognized and accepted surgical means for the reason that no other satisfactory method of treatment has yet been discovered, and because the surgical treatment of this disease is curative when properly applied by a competent surgeon who has made a special study of this complex and often very difficult disease to treat. The results from any other method of treatment are very uncertain and only occasionally give good results.

Much time has been spent in experimentation and study by different members of the American Proctologic Society on the different non-surgical methods of treatment for this disease. Joseph Mathews introduced the fistulatome; James Tuttle experimented with the injection of escharotics; J. Rawson Pennington put the use of the seton on a scientific basis; and other members have done useful work on electrolysis, cataphoresis, etc. But each and every one has always contended that the surgical treatment is the only satisfactory method and that the other means are merely adjuncts, though extremely important ones, in certain complicated cases.

The ambulant treatment of fistula by surgical means has been made possible by the perfection of local anesthesia, and simply consists in doing our regular operation in several steps, so that the area of raw tissue exposed at any one time will only be of such extent as will justify us in allowing the patient to be up and about after each treatment and thus throughout until a cure has been effected.

Operating by steps is nothing new in surgery. It is a recognized method and is

[1] Read before the American Proctologic Society, June 27, 1923.

used in several grave conditions, which can be easily called to our mind, being usually employed in run-down conditions or where a too extensive one-step procedure might endanger the patient's life.

The programme of this society only last year included a valuable paper by Dr. Louis Hirschman, in which he advocated the use of the multiple step operation in certain complicated and extensive fistula cases, for the purpose of conserving the patient's health and for the better plastic results to be obtained.

In the type of cases suitable for the ambulant treatment the question of the health or strength of the patient or the ultimate plastic results rarely enters. They are always cases suitable for a one-step operation, which as far as the surgeon is concerned is the method of choice.

The reasons for its use lie within the patient himself and are pretty well covered by three groups. First we have the individual who in an important managerial capacity is unable to take even a short vacation, or an employee who dare not lay off for fear of losing a position. Second, the poor person having dependents, who cannot discontinue his work nor pay a hospital bill. Third, the psychologic or psycho-pathologic group, which includes all those who have a horror of the knife, the operating table, the hospital, general anesthesia, etc. We naturally feel impatient with this group, but they are often not to blame for their unreasonable fixed ideas, and they can usually be handled by the ambulant treatment if proper tact be used.

The following short histories are illustrative of the above conditions:

Mr. A., in charge of a large shipbuilding plant during the war, was sent to me with a diagnosis of a rectal fistula. He was a healthy man of fifty-two and was putting in sixteen hours a day. He told me his rectal trouble was more a worry and nuisance than anything else, and wanted to know if anything could be done outside of a surgical operation, as it was impossible for him to lay off a day.

On examination I found a small discharging sinus on the right side of the anus just anterior to the midanal line. A cord-like induration passed back to the posterior commissure. Examination of the anal canal showed no pathology and the injection of methylene blue showed no internal opening. On further examination it was evident that the cord-like induration passed back to the neighborhood of the coccyx, where there was a depression, indicating that the fistula originated in a post-anal dimple. I informed the gentleman the affair could be handled by office treatments, and opened the tract for three-quarters of an inch the first visit. The tract was followed up by four more incisions at weekly intervals, when the cutaneous hairy sac of the dimple, about the size of a pea, was reached. This was excised with partial suture.

Mr. X., a banker, aged sixty-two, in good health, presented himself with a fistulous opening three inches anteriorly to the anus and slightly to one side of the median raphe. A blunt probe could be passed back to the margin of the anus. Examination of the anal canal showed an opening almost at the anterior commissure at the pectinate line, which was confirmed by the injection of methylene blue and peroxide. There was no history of abscess in this case, although the patient said the parts swelled and were tender at such times as the fistula was not discharging. A grooved director was passed into the track, and an incision an inch in length was made just anteriorly to the anus, leaving about one and a half inches of the anterior portion of the track intact. This was subsequently treated by the passage of a probe upon which was fused silver nitrate. Starting from the first incision the track was carried back to the internal opening in four more treatments without any inconvenience to the patient.

In this case the fistulous track passed through part of the external sphincter muscle and had originated at the base of a rectal pocket.

Mrs. Z., aged seventy-two, came to the

office with a large subcutaneous abscess on the right buttock two and a half inches from the anus about on the midanal line. This was incised with a crucial incision. Subsequent examination showed this woman to be suffering from a complex superficial fistula with five external openings, four on the right side and one on the left. There was an internal opening slightly to the right of the median line at the posterior commissure, at the usual location, the main track passing between the superficial and deep portions of the external sphincter. Considerable scar tissue was present on the right buttock, a monument to a previous ineffectual operation. This old lady informed me that she could not afford to go to the hospital, and as she had carried her trouble for eight years, she would have to make out the best she could, as from results of her first operation she had her doubts of their value. I treated this old lady for four months by short weekly incisions until the entire condition was completely healed, and at no time was her work interfered with, nor did she suffer the slightest inconvenience outside of adjusting her pads and taking her sitz baths.

The one important point to be taken into consideration in the selection of our cases for treatment is the determination of the anatomical relations of our fistulous tracks.

The first question we have to ask ourselves is where and how did the fistula originate? What was the nature and location of the preceding abscess? The history of the case will often answer this question. If the original abscess was perirectal or ischiorectal, the disturbance will have been so great that the patient will remember the symptoms sufficiently well to give us an idea of its origin. If the fistula has been preceded by an ischiorectal abscess, it is of deep type and will not be suitable for ambulant treatment.

If the patient does not remember a preceding abscess, or if it was small and close to the anus and not associated with fever and chills, we can be reasonably certain it is suitable for ambulant treatment.

Next we determine the position of the internal opening. If this opening is low down in the anal canal, below the pectinate line, we have an anal fistula and the main track will usually be found running between the skin and the sphincters. This is the simplest type of fistula and is always amenable to ambulant treatment, and if less than an inch in length can be taken care of in one treatment.

If the internal opening is situated higher up in the anal canal at the pectinate line, we have an anorectal fistula. The main track may be found passing between the sphincters and skin, through the external muscle or between the external and internal sphincters. The first two types are usually amenable to ambulant treatment, while the last is rarely so for the reason that when the main track passes between the internal and external sphincter muscle the track will usually be found quite deep in the ischiorectal fossa. When the opening is found up in the rectum proper, which is the rarest form, we have a rectal fistula which is usually of too grave a nature to allow the use of ambulant methods.

In mapping out our fistula, that is, in determining the location of the internal opening or openings, the relative anatomical location of the tracks and external openings, etc., several different methods of examination will at times have to be used.

The diagnosis is easy in short straight anal fistulæ and can be determined merely by the passage of a probe and digital examination. In complex cases it is often very difficult and may require several examinations, using different kinds of probes, the injection of colored fluids, the injection of bismuth paste, followed by stereopticon *x*-ray pictures, etc.

A point that does not seem quite clear in some of the literature on the subject is the relation of complete fistulous tracks to the external sphincter muscle. The external sphincter muscle is really composed of two parts, which might be called the superficial and deep. They are separated by a fibrous extension from the longitudinal muscular

coat of the bowel, which passes out fanwise, and is inserted in the skin at the anal margin and really forms a dividing line, at least laterally for the superficial and deep infections.

The route taken by a superficial fistulous track is between the anal skin and the superficial external sphincter, or following the longitudinal fibers between the superficial and deep portions of the external sphincter, while in the case of a deep fistula the main track usually passes between the internal and external sphincters and thus into the ischiorectal space. The superficial portion of the external sphincter can be incised with impunity.

Goodsall and Miles, in speaking of the treatment of those cases of fistula in which the track passes between the superficial and deep portions of the external sphincter, give the warning that after incising the superficial portion of the external sphincter, underneath which our fistulous tracks run, we should turn our knife and incise the balance of the muscle beneath the track, for otherwise in their opinion the incision is apt not to heal; they refer to this incision as the original salmon-back incision.

The advice of any of the surgeons of St. Marks is entitled to the highest respect, and in doing a one-step operation I always follow this procedure, but in doing the multiple step operation I have not followed this method, in spite of which the results have so far been on the average good, except in cases in which the main track is in the posterior commissure.

On the other hand, when the fistulous track is so superficial that it passes between the anal skin and the superficial portion of the external sphincter—in other words, when it does not pass between any of the fibers of the external sphincter muscle—I think it a good plan to make a back incision sufficient in extent to sever at least the fibers of the superficial portion of the external sphincter muscle, and thus improve our drainage, the *sine qua non* in the treatment of all these cases.

The deep or main portion of the external sphincter muscle is misnamed, for it is not a sphincter muscle at all. It helps in the closure of the anal canal, but does so by later compression, acting in much the same way as the levator ani in the upper portion of the canal. In fact a sphincter muscle could not possibly close a canal of this size. If we take a good size rubber tube and endeavor to close its caliber by constricting it by surrounding it with a tight rubber band (a constrictor) it will be found very difficult to close, whereas its lumen can be obliterated with the greatest ease by squeezing it between the thumb and finger by lateral compression. The internal sphincter is the only real sphincter we have, and its function appears to me to be simply a delicate approximator of the upper portion of the anal canal, probably aiding in the control of gas and liquid feces and being entirely dependent for support on the lateral compressive action of the internal sphincter and levator ani, without whose action it would be entirely helpless.

Therefore, in operating on superficial fistulæ, the question of incontinence need never be considered, for as long as the powerful lateral compressors of the anal canal and the fibrous splint which connects them are not interfered with, no harm can be done.

The explanation of this matter was first made in a paper on "Incontinence Following Rectal Operations," by Dr. George B. Evans, and printed in the "Transactions of the American Proctologic Society" for 1910, and also in an article on the same subject by Dr. Louis Krouse.

Occasionally patients with superficial fistulæ will also have external or internal hemorrhoidal varicosities, enlarged papillæ, cryptitis, or a combination of these things, requiring a general overhauling of the anal canal. In such cases we usually insist on a one-step operation to clean up the entire trouble; for if the fistula be cured and the other abnormal conditions be allowed to remain, the results will not be satisfactory.

In regard to blind external superficial fistulæ, I have nothing to say. I consider

every such fistula to have at least a potential internal opening and treat it as such. They are uncommon. Blind superficial internal fistulæ on the other hand are quite common and are much more difficult to handle than the complete. In cases in which the track runs downward along the anal canal a hooked probe is passed so that its tip can be felt under the skin on the anal surface. A counter-opening is here made, transforming the fistula into the complete form and then treated as such. In blind internal submucous fistulæ, in which the track of course runs upward, a grooved director is inserted, using a large caliber anoscope, and the mucosa incised over the director preferably with a fine electrocautery point.

It is not necessary to go into any great detail in regard to the technique of treatment before members of this organization. The following is my usual routine in the treatment of such cases: Once a week, preferably on Saturday, after the patient is through for the day, I incise the fistulous track for half or three-quarters of an inch, using novocaine local anesthesia, starting from what seems to be the main external opening. A grooved director of very small caliber and a narrow-bladed knife are usually necessary, as these superficial tracks are often of very fine caliber. A small piece of gauze is placed between the lips of the wound and held in place by passing it a short distance up the fistula. On Tuesday the gauze is removed, if it has not already fallen out, and a small strand of gauze is placed in the inner end of the cut, leaving the outer portion of the cut to heal. By the next Saturday the former cut will have granulated over, and the treatment is repeated until the inner opening has been reached. Where there are several branch tracks and openings I start on what appears to be the main track, and when an offshoot is reached this may be followed out at the same time, so that two incisions are made at each treatment, thereby saving time.

In order to keep the trauma to the minimum the wall of the sinus incised is not interfered with except in the posterior commissure, and it will be found that this readily forms the floor of the scar remaining after the treatment is over.

In cases in which the main track of the fistula is situated in the posterior commissure, we have found that the simple incision of this part of the fistula is not sufficient. A deep back incision through the base of the fistula is necessary. The gauze drain in the external portion of this incision should be kept in for at least one week, otherwise we are apt to have pocketing in the part of the incision at the internal opening with the formation of a short blind internal fistula or a recurrence of the old trouble. The necessity for this difference in procedure is caused by the anatomical relations of the parts. An incision in the lateral or anterior portions of the anal canal, if through any part of the external sphincter, results in a gaping of the wound, giving good drainage and allowing the wound to heal from the bottom, whereas in the posterior commissure the lateral compressive action of the sphincter holds the cut ends of our incision in close approximation, and if this is not overcome by a fairly deep incision and the retention of a gauze drain for a sufficient period of time we will have imperfect drainage and imperfect healing.

Dr. S. G. Gant in his most excellent work on "Diseases of the Anus, Rectum, and Colon," makes the following statement in regard to the question under discussion: "Advertising rectal specialists anesthetize and divide fistulæ one-half inch at a time at periods of a week or more apart, which prolongs the patient's mental and physical suffering without recompensing him in any way. The author incises short or long superficial sinuses completely at one operation, which requires little if any more time, and causes less suffering than segmental division of the tract."

With all due respect for this author's extensive experience we beg to differ with him in part on this subject. Because this procedure is followed by some advertising

rectal specialists is no argument against its value. These individuals oftentimes are very acute in instituting methods of treatment which are particularly pleasing to their patients, and which are neglected by those of us who are practicing along legitimate lines. In the second place I have not had any mental or physical suffering in my patients treated along these lines; and, lastly, I do not think it the best surgical procedure to have a patient up and around immediately following extensive incisions about the anus and rectum.

Conclusion.—The treatment of superficial types of fistulæ surgically by the ambulant method is legitimate and satisfactory. It is not the surgeon's method of choice except in the case of the short superficial sinus. For reasons that have to do entirely with the patient, quite extensive cases may be properly and successfully handled by this method.

Hydrochloric Acid Milk in Infant Feeding.

In the *Archives of Pediatrics* for July, 1923, FABER states that the use of sour milk has within comparatively recent times become increasingly popular. In this food the buffers were wholly or partly neutralized by bacterial growth producing lactic acid. Sour milk possesses the following features: (1) Its reaction is at or near the optimum zone for gastric digestion; (2) it requires little or no dilution to be well borne; (3) its relatively high percentage of fat is apparently much better borne than the same percentage in sweet milk; and (4) the sugar is reduced by only about 0.5 to 1 per cent. There are, however, certain objections to its use which have prevented its general employment for healthy and often for sick infants. Protein milk is so difficult of preparation that it is reserved for the treatment of serious disorders of digestion. Bacterial lactic acid milk is so sour that infants often refuse it altogether. It is variable in its composition and does not readily lend itself to flexible modification, particularly of its acidity and buffer value.

In the present study an attempt has been made to modify the reaction and butter value of cow's milk for purposes of infant feeding by using tenth normal hydrochloric acid (approximately 0.4 per cent). This method has the great advantage of giving a milk of known and readily controlled acidity and buffer value. Selection of the proportion of acid to milk to be used in practice has been a matter of some difficulty. On the assumption that the ideal buffer value of a formula should approximate that of breast milk, in most of his cases he added one part of tenth normal acid to four parts of milk (so-called 25-per-cent HCl milk). The titration curve shows that while the buffer value is not the same as that of breast milk throughout, about the same amounts of acid must be poured out for both by the stomach in order to bring the food to the assumed threshold of acidity for gastric digestion, pH 5.0. Clinically this percentage of hydrochloric acid to milk has appeared to give the best results for general use. It represents approximately the amount of secretion saved the stomach in digesting cow's milk.

In preparing the formula the acid is added last, in the cold, while stirring with a glass rod. It should not, therefore, be warmed above 100° or it will sometimes precipitate. It can be readily prepared in the home, since small mistakes in measuring the acid, which is very dilute, are of little consequence. The amount of acid is always calculated from the amount of milk, not the total formula volume. Whole or top milk is used. The relative amount of dilution is small, and is in part supplied by the added acid. The appearance of the cow's milk is not perceptibly changed by the addition of HCl until curdling begins, which is when about 35 per cent HCl per volume milk has been added. With the usual 25 per cent no acid taste is perceptible, and the milk is taken by the infant

without objection. The reaction of the 25-per-cent HCl milk, pH 6.0, is less than that of protein milk (about pH 5.5) and much less than that of bacterially soured milk (about pH 4.5). As a result of the addition of HCl, some of the insoluble basic calcium phosphate is converted into the more soluble acid phosphate, and a similar reaction is caused in the basic potassium phosphate, with the result that the potassium chlorides are increased, HCl as such disappears, and it must not be supposed that the feeding of milk with added HCl is in any way comparable to feeding HCl "straight." The addition of HCl to milk inhibits the growth of bacteria so that its keeping properties are increased to some extent.

In discussing the clinical results, Faber states that the most characteristic effect of HCl milk feeding, as of protein milk feeding, is the appearance, usually within twenty-four to forty-eight hours, of smooth grayish stools, consisting chiefly of calcium soaps. Soap stools have almost invariably occurred promptly in his series of cases, even when the consistency has for some days remained rather loose, due to the continuance of sugar additions. Experience has made it clear, as no doubt should have been anticipated, that acid does not facilitate the digestion of sugars, or at least does not obviate their ill effect when intolerance has been established. On the other hand, the indications are that the addition of HCl to milk affects very favorably the tolerance to fats, even when they have previously been ill borne. That the beneficial results obtained have been due to the acid has been shown in several cases, in which attempts to stop the acid were promptly followed by a return of symptoms. In some cases it has been possible gradually to withdraw the acid, but in others its use has had to be continued for months. No apparent harm has resulted from this.

He has used this modified HCl milk in some thirty cases, but only in the last twenty was a uniform technique employed. The series is therefore not large enough to justify more than tentative conclusions. The results, however, have been sufficiently uniform in certain respects to give definite promise of practical usefulness to the method in the treatment of diarrheas where the sugars are at fault, in the treatment of the common fat intolerance of infancy, in cases in which it is desirable to increase the caloric intake without increase in the carbohydrate or undue increase in the volume, in cases in which it is desirable to increase the intake of fats, and, quite possibly, in the feeding of normal infants whenever cow's milk has to be used.

In the series of cases there were about ten in which diarrheas, traceable to sugar, were cured by the HCl milk. Constipation has been exceptional in infants on HCl milk, differing in this respect from protein milk. Another difference is that consistently good gains in weight have been the rule, which are difficult to obtain on long-continued protein milk feeding. An impression has been gained from the observation of a limited number of cases that in firmness of flesh and in general appearance of well-being the infants fed on acidified top milk resemble those fed on breast milk. With HCl milk the transition to unsoured milk can usually be made with ease and as slowly or as rapidly as the patient's response permits.

From the experience that protein milk is not well borne by very young infants, and from certain other conditions pointing to the small digestive part played by the stomach of the new-born, Faber does not give HCl milk to children under six weeks of age. He asserts that as in the past we have paid great attention to the intelligent modification of the proportions of fat, carbohydrate and protein in infant's formulas, so we should in the future intelligently modify the acidity and buffer value, as being matters of primary importance to good digestion.

Editorial

THE COMING YEAR.

As our old subscribers know, and our new ones will find out, the THERAPEUTIC GAZETTE is designed to help the physician in his every-day work, whether he be devoted to internal medicine or to surgery. The endeavor is to present original articles having a direct bearing on treatment and at the same time to print abstracts from current medical literature, the world over, which have a similar bearing.

On several occasions during the last two years the GAZETTE has published a symposium contributed to by a number of prominent and authoritative medical men, as, for example, upon the treatment of tuberculosis in 1922, and in 1923 upon the Diseases of the New Born, The Choice of Anesthetics for Tonsillectomy, The Treatment of Eclampsia, of Placenta Prævia, and of Gonorrhea. In the coming year it has been arranged to have similar contributions upon equally important topics which have direct therapeutic bearing. For these reasons we believe that the GAZETTE in 1924 will prove fully as useful as in 1923, and we hope even more so, because the constant endeavor is to regard each reader as one who is actively in practice and desirous of obtaining the information which will help him to success.

SOME FACTS IN REGARD TO THE PRESENT STATUS OF SEROTHERAPY AND VACCINOTHERAPY.

At the recent meeting of the International Congress of Surgery in London, Bazy of Paris, in dealing with this theme, emphasized the point that immunity and specificity were inseparable terms and that we cannot confer real and durable immunity without specific intervention. He admitted that apart from antitetanic and antigangrene serum most of the serums used in surgery were uncertain in their effect, and his general feeling was that the use of vaccines could not be claimed to be of much value in the hands of the surgeon for the purpose of combating an infection already developed. He also thought that specific serums were to be used in urgent cases, and that vaccines, because of their comparatively slow action, were to be employed in cases not so urgent.

It is evident that there is still the widest difference of opinion between the medical and surgical practititioners as to the true value of vaccine therapy, for Bazy was followed by Wilkie of Edinburgh, who spoke most enthusiastically of the employment of vaccines, not so much to relieve infection which was already present as for prophylactic purposes. Thus, he stated that it was his custom, in patients undergoing operations on the lower intestine, to give ten days before the operation an injection of streptococcic and colon bacillus vaccine; to repeat this three days before the operation, and on the night before to give 8 cc of a 2-per-cent solution of nucleic acid, whereby he induced a distinct leucocytosis. He had tried this plan in sixty-three cases with results which led him to invariably follow out this procedure.

Wright, who is known from one end of the world to the other as the banner bearer of vaccinotherapy, in his discussion of this theme, introduced a number of new technical terms, which, while they may be useful in the laboratory, seem to us qualified only to create confusion in the mind of the general practitioner. He evidently agrees with Wilkie in thinking that the preoperative use of vaccine distinctly diminishes the danger of postoperative infection, and specifically points out that the swollen arm seen after a breast operation is due to streptococcic infection, which might possibly have been prevented if streptococcic vaccine had been employed before operation to increase the patient's resistance.

How much this view will be accepted by active surgeons would be interesting to determine.

We are glad to find Wright emphasizing

the point which we have often emphasized in these pages, namely, that the last thing that an antiseptic will attack in the body is the parasite infecting it. It is quite true that if organisms are placed in a test tube with an antiseptic, the chemical will attack the bacteria, because, as Wright puts it, it has nothing else to attack, but if put into the body it goes for the blood rather than for the bacteria, and the patient's leucocytes are more poisoned by the antiseptic than are the parasites.

Finally, Wright discusses the very interesting question of autogenous and stock vaccines. As our readers know, many believe that an autogenous vaccine is by far the best, although the difficulty in obtaining it in a great number of cases prevents its employment, but Wright states that the more he considers this question the more he is inclined to lean upon the stock vaccines because he says a patient with sixty furuncles may have a separate organism in each, which, of course, is an exaggerated way of putting the matter for the purpose of calling attention to it. Heretofore the statement has generally been made that if there was not a suitable autogenous vaccine at hand, the physician was justified in using a stock vaccine, but Wright reverses this, stating that the justification for the autogenous vaccine lies in the inability of the physician to obtain one arising from another source.

Last of all Wright brings forward the chief factor which has prevented vaccinotherapy from attaining its goal, because he insists upon a study of the leucocytes before and after treatment to determine the advisability of resorting to a vaccine and the wisdom of continuing it. In other words, he says, perfectly truly, that to be accurate the opsonic index should be known. The number of men who have the technique to estimate the opsonic index accurately is infinitesimal. These estimations have to be constantly made for the observer to maintain the accuracy which is essential for a correct estimation. The result has been that the administration of vaccines is often harmful, too little being given or so much being used that the patient is overwhelmed by the induction of a negative phase, during which time the bacteria living in his body make such tremendous strides that the physician in his endeavor to make the patient better in reality makes him far worse.

THE RELATIVE EFFECTS OF DRUGS ON MAN AND THE LOWER ANIMALS.

Any one who would attempt to assert that experiments upon the lower animals have been barren of results, so far as benefit to human beings is concerned, would be guilty of gross ignorance or deliberate falsehood. Such benefits are innumerable and are both direct and indirect, and the Editors of the THERAPEUTIC GAZETTE feel that such experiments are as justified as is the use of animal food for the proper sustenance of the human body.

Nevertheless it is wise from time to time to bear in mind that the anatomy and physiology of the lower animals are not identical with that of the human being, and for this reason drugs and other influences cannot, and do not, always exercise identical effects in both classes of subjects. On the one hand, the use of animals in determining the value of remedial measures is to be given the most careful study; and, on the other hand, the results obtained from such investigations, when they contradict carefully reached conclusions obtained at the bedside, are to be discarded or taken with a "grain of salt."

At a recent meeting of the Section on Therapeutics and Pharmacology of the Royal Society of Medicine of London, Kirk, who is a veterinary surgeon, contributed a paper upon "The Idiosyncrasy to Drug Tolerance of Animals as Compared with Man." We feel sure that our readers will be interested in some of the statements that he made. He points out that in the pig and the cat morphine causes excitement and convulsions, although it is an excellent hypnotic for man and the dog;

the point to be remembered, however, being that dogs take exceedingly large doses of morphine as compared to man. Indeed Kirk quotes Hobday as having administered on one occasion twenty-seven grains of morphine to an old poodle suffering from cancer of the throat with recovery of the animal. The horse, too, he tells us, will take with impunity about one hundred times as much opium as would poison a man, which is perhaps not so remarkable in view of its great difference in weight, but both horses and cattle become excited and restless and seldom can be made to be perfectly quiet or to go to sleep by this drug. This is in part true of dogs also, which are often excited by moderate doses, and in which, in our experience, morphine often acts as a purge.

Kirk also points out that a peculiar power of resistance to atropine seems to be characteristic of monkeys and rabbits, and that tartar emetic acts promptly as an emetic in dogs and pigs, but not in horses, cattle, or sheep, which, as he points out, is not remarkable, in view of the fact that the latter are ruminants.

Apomorphine, which in man and the dog produces prompt vomiting, has no such effect upon the pig, and exceedingly large doses of aconite can be given to the dog without producing toxic effects. Thus, for example, he cites the instance of a Scotch terrier which was given 30 minims of Fleming's tincture with recovery, although the normal dose, it will be recalled, is ½ to 1 minim. On the other hand a drachm of Fleming's tincture will usually destroy a dog with as much rapidity as an equal quantity of hydrocyanic acid. Aloes when given to dogs in the dose of several ounces fails as an efficient purgative, and he adds that nothing under one pound of magnesium sulphate will produce such an effect in a cow, while on the other hand horses are very susceptible to calomel, as are also cattle.

In connection with this matter of the influence of laxatives or purgatives, it is pointed out that a dog requires from 30 grains to one and a half drachms of aloes, but the animal may be seriously injured by half as much calomel, or half as much oil of turpentine, as is prescribed for man.

Recurring to the influence of morphine upon cats, it is pointed out that they become very much excited, tearing around the room and running up the curtains, if there are any hangings, sleep being almost impossible to induce.

In connection with cocaine it would appear that very large doses can be taken by dogs without producing death. On one occasion Kirk injected 25 minims of an 8-per-cent solution into various parts of the body of a twenty-five-pound dog which was suffering from multiple neoplasms. This resulted in clonic convulsions and finally tetanic convulsions, but under the use of chloral, chloroform and artificial respiration these symptoms passed off and a state of restlessness ensued. The after-effects, however, had entirely subsided by 10 o'clock in the morning of the next day.

He states that he has often used 2 grains of cocaine without any more alarming symptoms in the dog than salivation and licking of the lips, and Kirk adds that in some cases as much as 80 grains may be injected into the horse without producing death, although it causes excessive restlessness, and 60 grains injected into cattle produces an excitement bearing on madness and lasting for four hours, leaving no injurious effects.

He believes that the dose of cocaine for the dog is 1/10 gr. for each pound of body weight.

Concerning strychnine, the difference in symptoms induced by its ingestion by vertebrates is a difference in degree rather than in kind. Thus a dog may be destroyed in twelve minutes by 1/8 grain of strychnine and in two minutes by 1/6 gr., but Kirk considers the average toxic dose as 1/15 of a grain. Cats are even more susceptible and should not, in his opinion, receive more than one-fifth of a dose that would be safe to give to a dog; or to express the matter differently, Kirk rarely prescribes a greater

dose of strychnine for a cat than 1/200 gr. On the other hand the toxic dose for horses is from 3 to 6 grains, and a safe medicinal dose 1 grain.

It would appear that cattle are less susceptible to strychnine than horses, for Kirk reports that a veterinary surgeon other than himself gave an aged cow 30 grains of strychnine followed shortly afterwards by 60 grains, both in solution, with the result of a few spasmodic tremors which continued for about twenty minutes.

If the dose is given hypodermically, the effect is very different, and Kirk quotes Kaufmann as stating that the dose is 5 to 6 grains, but issues the warning that several cases of death have occurred following so small a dose as one grain given hypodermically. The poisonous dose for pigs is stated by Kirk to be 1/6 to 3/4 of a grain.

In this connection it is important to remember that in making post-mortem examinations, macroscopic or microscopic, of animals we must recall that certain conditions may be found which are in reality normal, but which, because they differ from those found in the healthy human being, may be interpreted as abnormal. Thus, in the cat, we believe it to be a fact that the uriniferous tubules and Malpighian tufts are surrounded by fat granules in the healthy animal, whereas this is not the case in other animals which are sometimes used for experimental purposes.

A NOTE ON INSULIN.

For very obvious reasons the literature upon this substance, which has created so much attention in connection with the condition commonly called diabetes, must accumulate by leaps and bounds. Indeed it is only by perusing several medical journals each week that one can keep himself abreast of the opinions which are expressed, as to its usefulness or limitations, by clinicians in various parts of the world.

We think it of interest to call attention to some of the opinions which were expressed at a recent meeting of the British Medical Association by a number of men with large experience and sound judgment.

As Sir Thomas Horder very wisely pointed out in his discussion of the subject of diabetes and insulin, the public has come to regard the problem of treatment of diabetes as already solved by the introduction of this new substance, but this is far from the truth. We think Sir Thomas spoke truly when emphasizing the fact that diabetes may be the result of several biochemical disturbances and that insulin will undoubtedly help to mark off certain definite types from other cases. He believes that it is true that some patients are benefited much less than others, and, further, that some are not benefited at all, and he asks the pertinent question to what level the blood sugar should be maintained to rest the pancreas most thoroughly; and again he raises the question as to whether it is a fact that the dosage of insulin may be controlled by examination of the urine only.

While gladly admitting that it was the greatest contribution yet made to the study of diabetes, nevertheless he insisted that we should remember that there are certain cases of renal glycosuria in which insulin is of no value.

Cammidge, carrying on the thought already expressed, also asserted that all cases of diabetes were not due to disease of the pancreas. It is true that the pancreas acts as a brake on carbohydrate metabolism and regulates the storage of glycogen in the liver, but he believes that there are three main types of this malady, namely, one type due to pancreatic deficiency, another to inability to store glycogen in the liver, and a third to factors which stimulate increased carbohydrate metabolism.

In Cammidge's opinion 80 per cent of cases have a pancreatic element but only 45 per cent are entirely pancreatic, and, of course, it is in the latter class that insulin is of the greatest advantage.

In the same discussion a point was still further emphasized to which too much

attention cannot be given, namely, that there is no set dose of insulin for any one patient, but that the quantity must be varied as the functions of the system vary from day to day, and in some instances almost from hour to hour. In other words, the expression that insulin takes the place of the pancreas in acting as a brake on carbohydrate metabolism is a happy one, because, just like a brake on a wagon or an automobile, it cannot be said that a certain pressure should always be exerted upon it, but that the brake should be used with varying degrees of efficiency to accomplish the purpose which is essential at a given time.

In closing the discussion, Banting, to whom we owe so large an amount of credit for the introduction of insulin, pointed out what many of our readers already know, namely, that the symptoms of hyperglycemia are most frequently a feeling of uneasiness or impending disaster, trembling, and, in children, pallor, increased pulse, and sweating, and, as more severe symptoms, incoherent speech, hunger, sleepiness, and coma.

Another point emphasized by Banting which should not be forgotten is that adrenalin in the dose of ten to fifteen minims would usually render conscious a patient comatose from the excessive use of insulin owing to its rapid action in turning out glycogen from the liver, and when conscious the patient should be given ten to twenty grammes of glucose by the mouth.

Banting also expressed the opinion that a diabetic could be treated as well by the general practitioner as by the specialist. This is undoubtedly true if the general practitioner has the time and training with which to make the different control tests of the blood and urine which we believe should be carried out. Some of those who have treated many cases of diabetes believe it to be wise to train the patient in the examination of his urine when depending upon dietetic treatment, and if the results of the urine examinations are considered an indication for the use of insulin, then, as has been tried by some clinicians, the patient may be instructed how to administer the insulin to himself. Manifestly only a small proportion of patients will be qualified to do this.

When we recall that the blood sugar varies constantly, when we recall also that there is a very narrow margin between normal blood sugar and hypoglycemia with its alarming symptoms, we confess that we would "stop, look, and listen" before permitting a patient to use this powerful remedy by his own hand.

WATER AS AN INTOXICANT.

In these days when the word "intoxication" is applied chiefly to the results of the excessive intake of alcohol or the results of bacterial invasion, or to the question of endogenous poisons, it is difficult to give an exact definition of what is meant by this term.

As a matter of fact there is no substance or liquid which, when taken into the body in excess, is not capable of producing pathological results and, therefore, capable of acting as an intoxicant. Salt is one of these, and its intoxicating properties depend not only upon the quantity ingested, but upon the ability of the kidneys to eliminate it, when it is taken in excess; and when these organs are lacking in the ability to eliminate salt, dropsy is induced, because the body retains its fluids in order to maintain the 0.9 salinity which is essential to life. Therefore, what is an intoxicating agent in one case may prove to be entirely without toxic properties, if used within bounds, in another patient.

Recently Rowntree, in the *Archives of Internal Medicine*, has stated that little or nothing is known concerning the effects of the excessive intake of water, and, further, that so far as he is aware the symptoms of water poisoning and the mode of death in water intoxication have never been determined.

The reason is not far to seek: the first being that people take water until their

thirst is assuaged, and when they take an excessive quantity, on the impulse of the moment, the skin and the kidneys eliminate it as fast as it is absorbed, and so, while the water may have been ingested, nevertheless the quantity in the body (outside the stomach) is kept within reasonable bounds. When water is introduced into the body in such a way that gastric absorption is not utilized—in other words, by intravenous injection, or by hypodermoclysis—it is very easy to produce water poisoning, since under these circumstances the organs of elimination cannot get rid of it quickly enough.

Rowntree then goes on to point out that water intoxication, at least in animals, is manifested by restlessness, weakness, polyuria, diarrhea, salivation, vomiting, tremor, convulsions (both tonic and clonic), frothing at the mouth, helplessness, stupor, and coma, and that death usually occurs in from four to twelve hours. Some of these symptoms are manifestly an effort on the part of the body to assist the kidneys in getting rid of the excessive fluid, namely, the diarrhea, the salivation, and the vomiting.

The cause of the symptoms is, in Rowntree's opinion, due to increased intracerebral pressure, and he believes that this in turn is probably a manifestation of disturbance in the salt equilibrium of the central nervous system; stating further that the symptoms can be alleviated or cured by the timely intravenous administration of hypertonic sodium chloride solution.

It has been known for a number of decades that the symptoms due to the introduction of water, or hypotonic saline solution in excess of the ability of the body to eliminate it, are due to the reduction in the tonicity of the body fluids.

Nearly forty years ago the writer of this editorial, working in the laboratory of Ludwig in Leipzig, was directed to carry out a research along these very lines, with particular reference to the condition of the muscles when hypo- and hypertonic solutions were made to circulate through them. When hypertonic solutions were used the tissues underwent shrinkage, because the fluids in them were abstracted in order that the fluids in the vessels might if possible equal 0.9 of 1 per cent, and when hypotonic solutions were employed the tissues became enormously swollen and hydremic, because the fluid passed into them, thereby producing swelling. The whole process depends upon the laws of osmosis. In other words, the belief expressed by Rowntree, as a result of his investigations, has foundation in studies made not only by the writer, but by numerous other observers who have studied the requirements of the body in respect to the quantity of salts which are in solution in its fluids.

More than once we have pointed out in these pages, what in effect is the statement in regard to water intoxication, namely, that there is too great carelessness in the subcutaneous and intravenous use of saline solutions which were not strictly insotonic with those of the body, and while it was thought at one time that a salt solution of 0.7 might be considered normal, in recent years, in the human being, it has been considered that 0.9 was more nearly correct as representing the tonicity of human blood. The common practice of adding a teaspoonful of sodium chloride to a pint of water with the idea that this makes normal saline is crude and capable of doing harm, because of the variation in the size of the teaspoonful and the height to which it is piled, and also because it provides the body with sodium chloride alone and not with a small part of the essential salts of potassium and calcium which must be used if normal saline is supposed to approach the chemical and physiological properties of body fluids.

The two points, therefore, which we particularly wish to emphasize are the one just named as to the accuracy in dosage of salt, and the other point as to the ability of the kidneys to get rid of fluid. It not infrequently happens that when a patient is passing so little urine as to cause the physician anxiety hypodermoclysis or even intravenous injection is resorted to with the idea of flushing the kidneys and making them pass water. If perchance, as is not rarely

the case, the oliguria is the result of renal incompetency, depending either upon functional or organic change, the too free administration of water, even when it is given by the mouth, may tend to produce mild forms of water intoxication, and doubtless in some instances, when the function of the kidney is slack because of a failing heart, pulmonary edema is induced, which is attributed to failure of the heart when in reality it should be attributed to the fact that water has been poured into the body so freely that finding its escape impossible it accumulates in the serous spaces and in the air spaces in the lungs. Here, again, is a manifestation of the fact that water may be a harmful agent.

THE TREATMENT OF NEUROSYPHILIS.

It is generally recognized that the treatment of neurosyphilis in the early stages of the infection, and when the lesions of the central nervous system are sufficiently pronounced to cause marked symptoms, is highly successful, indeed at times almost magical in its results. The precaution to be observed in these early cases, especially when the infection is a massive one, is to avoid the use of the arsenical preparations until a course of mercuric treatment has been given, which in itself will usually cause a prompt betterment or disappearance of symptoms.

Concerning the late manifestations of an infection which may have been latent for many years, there is some skepticism in regard to results which may be attained by treatment. These late manifestations have long been regarded as incidental to an irremediable degeneration of tissue and as indicating not at all a spirochetal infection still persistent and active. As strengthening this skepticism, excepting at the hands of a few enthusiasts, treatment of conditions such as paresis and locomotor ataxia by mercury and arsenic, either given in the ordinary way or introduced directly into the cerebrospinal fluid, has been of little avail. Concerning the latter method of applying the remedy there have resulted some tragedies, in the main unreported.

At the meeting of the Royal Society of Medicine, the proceedings of which are published as Volume XVI, No. 10, there is a discussion on this subject participated in by a number of men whose large experience entitles their opinions to careful consideration.

Buzzard opened the discussion by objecting to any distinction being drawn between the interstitial and parenchymatous varieties of neurosyphilis in so far as preventive or curative treatment is concerned. He believes that both these forms of tissue reaction show the presence in a more or less active form of the specific microörganism. He further notes that neurosyphilis can be prevented of a certainty only by complete eradication of the infection. Since we have no positive proof that the infection is ever eradicated he clings to the belief long since enunciated by Fournier that every individual who has been infected by syphilis should take intermittent treatment through life.

Buzzard further accentuates the fact, too little recognized, that as a proof of the cure of syphilis a negative Wassermann is entirely valueless. As to the intrathecal method he has seen no results following this which were better than those following ordinary methods of administration.

Bearing on the guidance of treatment by examinations of blood and cerebrospinal fluid he pays little attention to the Wassermann reaction of the patients suffering from tabes and those suffering from brain and spinal cord lesions. In the acute stages of the infection he considers a cytological examination of the cerebrospinal fluid sometimes helpful. The contraindication to specific medication lies not in the presence of albuminuria, but rather in that of renal inefficiency. Even the symptoms incident to optic atrophy he has seen improve under specific treatment.

MacCormac states that the plan adopted at the Middlesex Hospital since 1912, and one which has been found highly successful, is as follows: "First, a course of ten intravenous injections of a '914' com-

pound is given at weekly intervals, the first dose being 0.6 grm., the subsequent doses 0.9 grm. each. This is followed by twelve intramuscular injections of mercury also at weekly intervals, and then the Wassermann reaction is tested. If negative, mercurial treatment is continued until two years have been completed; if positive, the '914' course is repeated."

This treatment was applied to the early cases. Experience has shown that the effort to establish a permanently negative Wassermann reaction in the old cases is rarely attended by success, and he suggests for these old cases short intensive courses; for instance, ten intravenous injections of "914," followed by ten mercuric injections. There should be a repetition of this course from time to time. Attention is called to Fournier's statement to the effect that the primary lesion of the future neurosyphilitic may be transient, the secondary eruption trifling or absent, and that so little inconvenience may be caused by these manifestations of infection that the patient may entirely forget them in the course of years. Bearing on early involvement of the central nervous system, as indicated by an increase of cells, of globulin, and a positive Wassermann, Wechselmann has found such changes before the skin eruption has appeared. Others have reported that from 68 to 80 per cent of all cases will exhibit these signs of involvement of the nervous system.

As to the direct introduction of the arsenical preparations into the cerebrospinal fluid, MacCormac points out that these compounds do not act directly upon the spirochetes, but are efficient only because they stimulate the production in the system of an antisubstance. He notes that the results from the usual intravaneous injections in neurosyphilis are often not manifest for several months, and is inclined to believe that improvements reported as following these intrathecal injections after failure by intravenous treatment are to be attributed really to the previous intravenous treatment.

Sir James Purves-Stewart spoke particularly upon the intracisternal treatment of selected cases of general paralysis. As a result of this treatment he noticed a fall in the cell count of the cerebrospinal fluid and an improvement of the patient. He enters the skull through the atlanto-occipital ligament and tabulates six cases: in one Jacksonian fits entirely disappeared; in another the facial tremors of early general paralysis were lessened; in one there was a betterment of the mental condition; in one there was rapid improvement of hand weakness; and in one suffering from emotional attacks without physical signs apart from the blood and cerebrospinal fluid, there was rapid disappearance of all symptoms.

Symonds sounds a warning in regard to large dosage. The neurological department to which he is attached began giving the patient 10 grammes of arsenical preparation as the first course. This resulted in so many cases of jaundice and exfoliative dermatitis that this quantity is now being given in two courses with six weeks interval between them. He notes a case of tabes actively progressive, with a negative Wassermann both of blood and cerebrospinal fluid.

Feiling also sounds a note of warning against large doses, citing two cases in corroboration of the justice of his fears.

Harris notes that he has seen acute nephritis result from arsenical treatment several times. He reports distinct benefit, in so far as the pains of ataxia are concerned, following the intrathecal injection of serum. After the intravenous injection of salvarsan he always waits two weeks before drawing the patient's blood and administering the serum intrathecally. The immediate result is an atrocious exacerbation of the pain, requiring morphine for its control. Thereafter a long remission.

Buzzard in closing the discussion and in relation to Sir James Purves-Stewart's work on cisternal injections, stated that "the cases he had brought forward did not convince him (the speaker) that there was any advantage in the method. The cases to which Sir James referred as satisfactory were of the kind in which one would expect

satisfactory results from intravenous or intramuscular injections, and he did not understand why the satisfactory result was attributed to injecting salvarsanized serum into the cisterna when the patient had already had salvarsan injected into the vein. Moreover, Sir James had rightly said it was an operation that required a stout heart—on the part of the patient as well as of the operator."

THE ELECTROCHEMICAL INTERPRETATION OF SHOCK AND EXHAUSTION.

It will be remembered that Crile has long since demonstrated that when death occurs as the result of exhaustion incident to any one of a variety of causes, including infection or from shock, whether it be emotional or traumatic, there are found certain changes, particularly marked in the cells of the brain and liver, which indicate that these changes are at least part of the phenomena incident to the devitalizing discharge of energy. Among the more recent theories advanced as to the cause of surgical shock, that is, depressed vitality incident to trauma, that which has received largest acceptance is the one which attributes the symptoms in part at least to the absorption by the traumatized area of tissue poisons. Henderson's acapnia theory, to wit, that a factor in the production of shock is deficiency of CO_2 content of the blood, has not been widely accepted. The investigations concerning blood distribution in shock have, however, been distinctly helpful as indicating that the cellular changes in the vital centers may be, and indeed probably are, incident not only to a deficient blood supply, but in cases of exhaustion to blood supply lacking in those physical and chemical properties which carry to the poisoned cell its appropriate nutriment.

Crile (*Surgery, Gynecology and Obstetrics*, September, 1923) has written with his customary vivid enthusiasm and argument, backed by extensive laboratory research, to demonstrate that man is an electrochemical mechanism constructed on a pattern made up of a multitude of individual cells separated each from the other by a semipermeable membrane and each containing colloids of different reactions, the nuclear portion of which by selection takes best an acid stain and is separated from the body of the cell which takes best a basic or alkaline stain.

The content of the cell body and of the nucleus consists in the main of colloidal solutions. Two colloids of different reactions separated from each other by a semipermeable membrane constitute an electric cell, and an electrochemical unit. Each of these units is dependent for its production of power and heat upon the difference in potential, and this difference in potential can be maintained only as long as there is oxidative action, and can be continued as long as oxygen is carried to a cell by the universal solvent, water. In addition to oxygen, since the cell is constantly functioning, it must have brought to it by the blood and have diffused through its investing membrane, composed, according to Frick, who has been working in Crile's laboratory, of a film made up of one layer of oil molecules 1/10,000,000 of a centimeter in thickness, other substances upon which its maintenance as a living cell depends.

In his studies Crile has taken up the question of electroconductivity measurements and measurement of temperature changes and measure of electrical capacity. His findings led him to this definition of shock and exhaustion:

"The conception that man is an electrochemical mechanism supplies an interpretation of the principal phenomena of quiescence, stimulation and exhaustion which constitute normal life; it supplies a new basis for the analysis of pathological phenomena. In accordance with this conception, exhaustion is the result of a diminution of the difference of potential between the poles of the organism, due to

a decrease in the brain, which in turn results from a decreased difference in the potential in its constituent cells. This conception explains the identity of the phenomena of exhaustion and the progressive degrees of exhaustion to shock. When the difference in potential reaches zero, the organism is dead."

The following facts are interpreted by the hypothesis that the body as a whole is an electrochemical mechanism, the positive pole being the brain, the negative the liver, the connecting wires the nerves, the salts in solution the electrolytic fluid in which the electrochemical mechanism is immersed.

When either pole, *i.e.*, the liver or the brain, is removed or destroyed, the organism perishes.

If the difference in potential within the cells, no less than the difference in potential between the poles (the liver and the brain), is dependent on the supply of electricity by oxidation, then it follows that if the organism is deprived of oxygen the existing difference in potential within the cells and within the organs is lost, and equilibrium, or death, is established.

The facts that water is a non-conductor and a solvent, whereby the atoms within the colloidal solutions of which the cells are composed are enabled to take on electrical charges or to become ionized, and that ionization is essential for electrical communication, suggest the essential rôle of water in living processes.

Since the speed of chemical action and the electrical conductivity are fundamentally controlled by heat and cold, it follows that in an electrochemical mechanism there must be an optimum temperature as well as a lethal cold and a lethal warm temperature. Abdominal surgery in the colder months in unwarmed front area huts illustrated this point by a forbidding mortality rate.

The opposite effects of stimulation and of exhaustion on the temperature and on the electrical conductivity of the brain and of the liver, the muscles and other tissues in the splanchnic area, would be explained by the conception that the driving power depends upon the difference in potential between the brain and the liver, muscles, and other organs. Hence, if a stimulus caused only the potential of the brain to rise and the liver remained unchanged, the difference in potential, hence the driving power, would be correspondingly less.

The electrochemical theory would interpret the specific antithetic action of adrenalin upon the temperature of the brain and of the liver and other organs in the splanchnic area.

It would interpret the increase in electrical conductivity of the brain by iodine, iodoform, and thyroid extract (hyperthyroidism); and the decreased conductivity of the brain after thyroidectomy.

It would interpret the interference with digestion by the strong emotions, by injury, by pain, by infections, etc., for the splanchnic processes are inhibited while the brain is stimulated. It would interpret the antithetic effects of fear and faith, and the failure of health in man and animals under the stress of chronic fear or anger or other strong emotions.

This theory would suggest that the essential function of sleep is to provide a period during which, in the batteries which drive the organism, the difference in potential decreased by the activities of the day is restored.

It would interpret the fact that in surgical operations, if a state of negativity and the internal respiration are maintained, there is no surgical shock.

The state of negativity is maintained by:

(*a*) Exclusion of fear by management, by operation in the patient's room, by morphine, by analgesia.

(*b*) Exclusion of traumatic stimuli by local or regional anesthesia, by gentle handling, by protection of the wounds from the irritation of the air.

(*c*) Exclusion of stimulation by stimulant drugs.

The entire process whereby the state of negativity is secured and the internal respiration—difference in potential—of the

cells is maintained is included in the combination of methods of preoperative and postoperative management and of surgical technique which is called anociation. The internal respiration is maintained by fluids, by warmth, by blood transfusion, by rest, by sleep, and by the avoidance of deep inhalation anesthesia.

From the surgeon's point of view the avoidance of shock or its successful treatment when it is developed is perhaps the most important single life-saving problem. Crile's researches have not been received with universal favor by laboratory workers. His teachings as to the avoidance of shock and its treatment when developed have been accepted universally by the surgeons of the civilized world, and their application has caused enormous salvage of life and suffering. His latest pronouncement is perhaps one step further in placing his clinical work upon a sure laboratory foundation. He points to colloidal changes produced rapidly by extensive trauma, changes which lessen or abate the function of the nerve centers. It is recognized that the brain receives an enormous supply of blood, has no oxygen storage, that its functions cease promptly when the blood supply is cut off and that they cease permanently in the main when blood supply is cut off for even a brief period, a period apparently much shorter than is needful to cripple other structures of the body. The old teaching in regard to shock actively promulgated by Horatio Wood was to the effect that it was due to a lack of proper distribution of the blood; that this lack might be caused by either a psychic, sensory or physical trauma. This deficiency of blood supply to those cells which most urgently and constantly need it, would seem to be in so far as it goes an adequate explanation of symptoms.

Progress in Therapeutics

Medical Therapeutics

Surgery of the Endocrine Glands.

W. J. Mayo, before the International Congress of Surgery *(British Medical Journal,* July 21, 1923), in discussing the splenic syndrome, stated that from the time when the Greeks were supposed to have removed the spleen from their long-distance runners there had not been, till recently, any great advance in knowledge of its functions. It was now known that the spleen was concerned with the blood and was closely associated with the liver. It was chiefly a mechanical filter removing from the blood degenerated red cells and toxic agents above colloid size. Such were microörganisms and débris on which it acted before sending them to the liver for further detoxication and elaboration. It also developed lymphocytes. It might have as one of its functions the removal of oxygen from the blood, so preparing it for the action of the liver upon it. While the function of the normal spleen was unimportant, the diseased spleen was a serious menace to the constituents of the blood and to the liver. The action of the spleen might perhaps be biophysical rather than biochemical. It did not initiate the pathological processes in which it was concerned, but acted as a secondary agent. Removal of the organ in the splenomegalous and in certain blood diseases removed a pathological agent or broke up a vicious circle. In the estimation of the benefit to be derived from its removal the entire syndrome of which it was a part must be considered. A chronically enlarged spleen which did not yield to reasonable medical treatment should be removed early unless in the individual case there were contraindications to splenectomy.

The number of splenectomies performed in the Mayo Clinic for various conditions up to June 1, 1923, was 304. All deaths occurring in the hospital are classified as due to the operation, without regard to the length of time following operation, or to the cause of death.

Splenomegaly Due to Microörganisms.—(1) Syphilis, chronic, 8 splenectomies, 1 death in hospital, good results in 7; (2) tuberculosis, 4 splenectomies, 1 death in hospital, good results in 3; (3) pyogenic organisms, 15 splenectomies, 4 deaths in hospital, good results in 6; no patient with septic endocarditis was cured; (4) splenic anemia, 85 splenectomies, 11 deaths in hospital, good results in the great majority of the remainder. A number of the patients who made good recoveries had typical Banti's disease with advanced portal cirrhosis. Ten patients had gastric hemorrhages during the first six years following operation, and died directly or indirectly from that cause.

Hemolytic Icterus.—Forty-four splenectomies, 1 death in hospital; 40 patients recovered perfectly; 60 per cent of the patients had coincident gall-stones which required operation.

Pernicious Anemia.—Fifty-seven splenectomies, 3 deaths in hospital, no deaths among the last 38 patients prepared by blood transfusion. The improvement in all was much more prolonged than that following blood transfusion alone. Over 10 per cent of the patients lived more than five years following splenectomy, and over 22 per cent more than three years following splenectomy. There were no cures, but the abnormal blood picture improved. Splenectomy in pernicious anemia is justified in only a limited number of carefully selected cases. Elderly patients with advanced conditions and aplastic types of the disease should not be considered for surgical treatment.

Polycythemia Rubra Vera.—One splenectomy, great improvement; the patient is able to work more than former years.

Hemorrhagic Purpura (Essential Thrombopenia).—One splenectomy, in advanced stage of disease; good recovery.

Splenomyelogenous Leukemia.—Twenty-nine splenectomies, 1 death in hospital, great temporary benefit in 28. Six are alive and able to work, one more than six years following operation. The condition of the blood is improved, but not normal. There is less anemia and less evidence of toxemia in splenectomized patients.

Sixty-one miscellaneous cases, many of which had not been accurately classified, were not discussed in this paper.

The Differential Diagnosis of Smallpox and Chicken-pox.

WANKLYN, in the *British Medical Journal* of July 21, 1923, states that any one who wishes to gain a really sound grounding in this subject will be well advised to assign beforehand their true value to certain traditional criteria with which he may have been equipped as a student. There are certain phenomena which frequently occur but are not pathognomonic in the hour of trial for the purpose of distinguishing between smallpox and chickenpox. Into this category fall umbilication, shottiness, palatal and buccal lesions, lesions on the sole of the foot, cropping, uniloculation. Not one of these is a real friend in need; and the first four may prove to be very unreliable in the matter of the assistance which they offer.

In his article in the Jenner Memorial Number of the *British Medical Journal*, dated July 5, 1902, on "The Differential Diagnosis between Variola and Varicella," the following observations were made: "It is well at once to say that the words 'shotty' and 'umbilicated' are mere broken reeds to lean upon in the matter of diagnosis. The expressions are pernicious in two ways: their absence in a case suspected to be smallpox is taken as evidence against that disorder, and their presence in a case otherwise suggestive of varicella is held to negative that disease. The words are fetishes, or objects of superstitious worship, which help their devotees as little as do most idols, and mislead them far

more. They should be treated as such and discarded. In the differential diagnosis of smallpox there are no more fertile sources of error."

Twenty-one years have rolled by since those words were penned—years constantly spent in consultations upon the numerous remarkable examples of cases simulating smallpox which a metropolitan area and its neighborhood can show, drawn as they are from a population of about 8,000,000 persons of all grades, classes, and races; and this experience has emphasized the general truth of the above mentioned comment. That comment applies in fact to all six of the above mentioned points. There is this much to be said by way of modification: in proportion as the newer criteria are coming to be known as being more reliable, so less is now heard than formerly of shottiness and the rest.

Once more it must be said that there is no royal road, no beaten track, no measuring tape or touchstone, which will infallibly rescue the perplexed. Any case under review should be cross-examined, so to speak, on four main points: (1) What is the distribution, general and local? (2) What is the degree of prostration? (3) What is the depth of the lesions in the skin? (4) What is the rate and manner of maturation of the lesions?

The whole of the evidence must then be summed up and the verdict given accordingly.

The Ill Effects of Quinidine Administration.

CLARK-KENNEDY, in the *Proceedings of the Royal Society of Medicine* for July, 1923, states that the ill effects are numerous and may be best described as follows:

The general symptoms of quinidine intoxication were headache, nausea, vomiting, diarrhea, and abdominal pain; these have been common, but they frequently pass off in the early stages without reduction in dosage of the drug. Excessive vomiting, in one instance associated with dangerous collapse, only occurred in two cases, but in both normal rhythm was only transiently restored. A mild degree of pyrexia coincided with the maximum of quinidine administration in ten cases. All these patients were relatively young, and nine were definitely rheumatic. Whether this is due to a direct action of the drug on the heat-regulating center or to the lighting up of a low-grade infection is uncertain. In one case the patient developed glycosuria twenty-one days after quinidine had been discontinued. Two cases developed papular scarlatiniform rashes, one urticaria, and a third an eruption closely resembling that of measles. Visual symptoms and attacks of faintness were fairly frequent during the maximum of quinidine administration, and were almost invariably associated with the fall in blood-pressure that the drug is known to produce at this stage. No retinal changes were observed.

The large majority of patients have tolerated the prophylactic administration of the drug over a year or more without symptoms.

Embolism consequent on the restoration of auricular function occurred shortly after the restoration of normal rhythm in four cases. In one of these the embolus was pulmonary and the patient died suddenly. Autopsy, however, showed that it had been derived from thrombosis in the iliac vein and *not* from clots in the auricular appendices. In his very first case simultaneous infarction of the lung and kidney and embolic blocking of a popliteal artery occurred. The patient, however, recovered completely, normal rhythm has persisted for over a year and a half, and she remains practically free from cardiac symptoms. In the other two cases the embolus was splenic. No doubt he has been fortunate in that no case of cerebral embolism has been seen. Excluding the fatal case, which is irrelevant to the present discussion, the other three patients all had mitral stenosis and auricular fibrillation of eighteen to thirty months' duration.

It is not surprising that the auricle, when it first starts to contract after several months of fibrillation, should expel thrombi

into the pulmonary or systemic circulations. But the incidence of embolism in the early cases of his series was particularly high, and his more recent cases and the results of other workers would tend to show that the risk of embolism is not as great as Ellis and he first supposed—possibly indeed little greater than under digitalis treatment alone.

In all the unsuccessful cases, to which large doses of quinidine were administered, symptoms of cardiac decompensation were produced. No fatality occurred under such circumstances, and these symptoms quickly passed off when the drug was discontinued. In all these cases quinidine treatment had to be abandoned on this account rather than on account of the general toxic effects produced. The patient in one case, however, a female with rheumatic heart disease, a large heart, mitral stenosis, and chronic high blood-pressure, received a total of 180 grains of quinidine with a maximum dosage of 9 grains six-hourly. This failed to restore normal rhythm and the drug had to be discontinued on account of symptoms of failure. A long course of digitalis now caused coupled ventricular beats. Digitalis was now stopped and quinidine immediately readministered. The patient died suddenly after the second 5-grain dose. Post-mortem examination failed to reveal the cause of sudden death.

To give quinidine immediately after digitalis had produced coupling was certainly a therapeutic mistake on his part. It seems to him that in this case death should be attributed at least as much if not more to digitalis than to quinidine. This is the only fatality that he has to report in his series of forty-five cases. One other patient, however, a woman aged forty-five, with pulmonary stenosis and a large heart, had a sudden syncopal attack in which she nearly died.

The pathogenesis of death in these fatal cases has received various explanations, but autopsy, as might be expected—save to exclude embolism—has yielded no information. Heart block, ventricular fibrillation, and failure of the sinoauricular node to begin initiating stimuli, when fibrillation ceases, have all been suggested.

He has occasionally observed symptoms of a cerebral nature. Three of his patients suddenly felt confused, seemed to lose themselves, and then shrieked out. One patient, according to the nurse's account, suddenly became unconscious, rolled her eyes, and frothed at the mouth. A little later she became extremely restless, she shrieked out wildly, and morphine had to be administered. These attacks occurred either shortly after the restoration of normal rhythm or during the maximum of unsuccessful quinidine administration. He is inclined to attribute them to transient interference with the blood supply to the brain rather than to embolism or the direct action of the drug on the cerebrum.

Von Frey has described the occurrence of respiratory paralysis during the administration of quite small doses of the drug. No such case has come under the observation of Clark-Kennedy.

Suction in the Treatment of Septic Ears.

STUART-LOW, in the *British Medical Journal* of July 14, 1923, states it is essential that the practitioner (who in almost all cases has the patient suffering from a discharging ear under his treatment for some time, it may be for months) should realize the disadvantage, not to say danger, of aural syringing. He sees the patient in the earliest stages, and has a much better opportunity than the specialist, who commonly only comes on the scene after the trouble has been long established or complications have arisen.

The intricate anatomical arrangement of the middle ear and its accessory recesses is favorable to bacterial activity. The best known methods of combating bacillary ravages in this region, other than a surgical operation, consist of forcibly syringing out accumulated discharges and the instillation of antiseptic drops. But the risks involved in syringing out the middle ear in the presence of a chronic discharge are very great. This is aptly illustrated in the case

of cholesteatoma. Even the advocates of forcible syringing invariably add a word of caution when dealing with this state. Usually, in cholesteatoma, especially if it has arisen, as is almost invariably the case, after prolonged sepsis, there is found an enlargement of the normal aural cavities and mastoid cells, and any watery lotion, if powerfully injected, can easily be driven far afield into the recesses. The effect of syringing is to cause swelling of the semi-desiccated accretions and accumulations, and pressure on the surrounding brain and labyrinth. All watery fluids encourage septic change and bacterial growth.

He has seen many cases in young children, in whom the syringing of running ears has been ordered, where the immediate result of a more than usually forcible injection by the child's mother has been acute mastoiditis and abscess. Indeed, but few cases of acute mastoiditis in children have come under his notice where syringing has not been the customary treatment, with the result that an immediate cortical mastoid operation, which might otherwise have been unnecessary, was rendered imperative. He cannot, therefore, condemn syringing too emphatically. He wholly disapproves of syringing the ear in the presence of a discharge. He orders his patients boracic wool, with directions to twist it up and to wipe out the ear as often as necessary. Syringing may have the effect of driving the sepsis further afield, and on into the most dangerous positions, such as the attic, aditus, antrum, and mastoid cells, becoming in this manner a cause of abscess over the mastoid region.

Owing to his dissatisfaction with all forms of ablution and irrigation, and with much of the instillation of ear drops that is still so popular, the author has for some years been employing suction to get rid of discharge from the ear and its annexes. This suction method of thoroughly clearing the septic ear of discharge is so successful that he is anxious to bring it prominently to the practitioner's notice, who, as he sees these patients in the earliest stages of the trouble, can adopt it with more telling effect. The suction method is so easily applied and is so safe and effective that it is eminently adapted to the use of the busy and overworked medical man, and if adopted by him would serve to prevent so many septic ears drifting into a serious condition and the patient having to be sent suddenly to hospital for operation. It is where such emergency operations have to be performed, always in a dirty pus-saturated field, that fatal complications such as septic meningitis are likely to arise.

The simplest method of applying suction to the aural cavity is to attach to the nozzle of a medium-sized glass syringe, or a larger metal syringe, a short length of rubber tubing which must be inserted into the ear, the piston being drawn out to allow all purulent material to be sucked away. The action is the reverse of syringing, and the addition of the rubber tubing precautionary. Until the ear is dry this method must be repeated with the aid of a good reflected light, which is always desirable. The use of a motor suction pump, with special fine pointed glass tubes bent in several directions, under a good light is a more elaborate and effective method. These tubes may be inserted, under a good light, into the many recesses of the tympanic cavity, up into the attic, down into the depressed floor of the tympanic recess, and back into the aditus.

For acute otitis media following paracentesis tympani all the pus from the middle ear may be sucked out by inserting a finely pointed tube into the incision of the membrana tympani. This treatment, added to the application of bell-shaped dry cups over the mastoid, he continues at intervals for forty-eight hours, a mastoid operation being thereby avoided, provided the treatment is used without delay during the inflammatory and congestive stages.

For chronic aural suppuration suction is employed in the ear, over the mastoid, and over the site of the exit of the mastoid vein, passing out directly from the lateral sinus; it should be repeated once or twice

or even thrice a day for at least one month. This method, when carefully carried out, has, with very few exceptions, the effect of avoiding operative treatment. The system of suction is the means of clearing the ear of discharge so effectively that it prepares and secures a clear field for operation, should this be necessary, and prevents the most dangerous complication—septic meningitis.

The Prescribing of Diabetic Diets.

In the *New York Medical Journal and Medical Record* of August 15, 1923, CORNWALL states that in the average case the first thing to do is to clear the urine of sugar. For this purpose partial or gradual starvation is preferred. Severe cases which resist a considerable degree of starvation may be given insulin.

After the urine is sugar-free, the carbohydrate tolerance should be ascertained by gradually increasing the diet. In this process the protein ration can usually be raised to meet the basal protein requirement very quickly. The basal protein requirement for adults is taken to be two-thirds of a gramme or one gramme of protein per kilogramme of body weight, and for children about two grammes.

The carbohydrate tolerance is found by gradually increasing the carbohydrate in the diet until sugar again appears in the urine.

The fat ration is usually increased slowly while the carbohydrate tolerance is being determined, and then it is increased sufficiently to supply the basal metabolic requirement. The basal metabolic requirement for the patient at rest is found by multiplying his weight in kilogrammes by thirty.

After the carbohydrate tolerance is found and the basal metabolic requirement satisfied, that is, after a subsistence diet has been achieved, the fat is increased, and possibly the protein also in some cases, so as to supply enough calories to enable the patient to lead a more active life than is possible on the subsistence diet.

In increasing the fat ration the safeguarding antiketogenic glucose fatty acid ratio must be borne in mind. This ratio fixes a limit to the amount of fat which can be taken with a given amount of carbohydrate without regularly producing acidosis. The figures for this ratio have been variously stated. A widely accepted statement of it has it as one to one and five-tenths, counting as glucose all of the carbohydrate, with fifty-eight per cent of the protein and ten per cent of the fat, and counting as fatty acid ninety per cent of the fat and forty-six per cent of the protein. Another statement of it which is favored by good authorities has it as one to three, counting as glucose all of the carbohydrate with sixty per cent of the protein, and as fatty acid all of the fat. The limits set by these ratios are not always found to insure against acidosis.

In cases which cannot take care of the basal metabolic requirement, and also cases which cannot take care of a diet sufficient to meet the energy requirements of the mode of life desired, insulin may be given. The pathological examinations which are essential are these: examination of the urine for glucose and ketone bodies, estimation of the blood sugar, and perhaps estimation of the carbon dioxide of the blood plasma.

The Effect of Magnesium Sulphate on Blood-pressure in Acute Nephritis.

BLACKFAN and MILLS, in the *Archives of Pediatrics* for July, 1923, state that in studying the dehydrating action of calcium and magnesium salts in acute nephritis they had observed there was a lowering of the blood-pressure following the administration of magnesium sulphate. When a 2-per-cent solution of magnesium sulphate was given intravenously, in selected cases, the blood-pressure promptly fell and remained at a low level for about five hours.

With the fall in blood-pressure, the headache, visual disturbances and convulsions have abated. The injection is followed usually by diuresis, diaphoresis, or free catharsis. The procedure has had no apparent effect on the albuminuria or hematuria. The fall in blood-pressure begins usually after the introduction of 15 to 20 cc of the solution. When introduced slowly at the rate of 10 cc per minute, the respiratory and cardiac rates are not changed. The total amount given at a single injection has not exceeded 10 cc per kilogramme body weight.

[We believe this method should be resorted to with caution.—ED.]

Pyelitis in Infants and Children.

In the *Journal-Lancet* for August, 1923, JOHNSON states that in the acute form, absolute rest in bed is essential until after the temperature has remained within normal range for four or five days. After this time gradually allow freedom of the house; use hydrotherapy for fever if needed; active bowel elimination at the onset; broken doses of calomel followed by saline or a full dose of oil; bland diet according to the age of the child, mostly liquid at start, milk whole or skimmed or buttermilk, and plain water in large amounts. Note that the amount of fluids is perhaps the most important part of the treatment, mechanically washing and cleaning out the urinary tract; liquids should be given in every possible form. If they are refused or are vomited, recourse may be had to other means, such as rectally, subcutaneously, even intraperitoneally or intravenously, but give them. Heat applied over the abdomen and loins is very grateful to the patient.

As to medication, alkalies have generally proved the most useful, probably because most cases are colon bacillus infections with an acid urine. Alkalinizing the urine and maintaining it so should inhibit this organism to some extent. The amount of alkali used should be sufficient to keep the urine alkaline. Sometimes this means large amounts.

Give potassium or sodium citrate with an equal amount of sodium bicarbonate well diluted. The doses of the citrate as given in two to five grains to infants are probably altogether too small. We may start with forty to sixty grains daily and more if needed; older children in proportion, remembering when giving large doses of alkalies to children over a period of time to look out for alkalinosis, manifesting itself by edema of eyelids or general edema, subnormal temperature, drowsiness, twitching, even convulsions or coma, remembering also that the bacteria may become alkali fast, then change to acid treatment. Sodium phosphate or sodium benzoate with urotropin would be in order. Sometimes good results may be obtained by alternating alkaline and acid treatment.

In chronic cases, medication is the same as in acute, plus possibly vaccines, and in obstinate cases the newer methods of ureteral catheterization and pelvic lavage, followed by instillation of antiseptic solutions. In addition use roborant measures, fresh air, baths, a sufficient quantity of unirritating food, and tonics if needed.

Contribution to the Pathologic Physiology of Botulism.

EDMUNDS and LONG, in the *Journal of the American Medical Association* of August 18, 1923, state that there is in botulism a partial paralysis of the endings of the motor nerves going to the voluntary muscles. In some cases this curare-like action is almost complete, as in the case of the nerves supplying the neck muscles of chickens. This action will explain all of the characteristic symptoms of botulism which are motor in origin. The involvement of the phrenic nerves explains the early paralysis of the diaphragm. The effect of the toxin on the nerves to the respiratory muscles is responsible for the gradually increasing weakness of the respiration, and for its final failure, which

is responsible for death under this form of poisoning.

The involuntary muscle of the esophagus, stomach and intestine acts in a normal manner to adrenalin, physostigmine, and other peripherally acting drugs, indicating that the symptoms, such as difficulty in swallowing and constipation, are probably not due to an action of the toxin on structures located in the gastrointestinal wall. The vagus nerve is also affected, as it largely loses its control over the heart-rate, thus probably accounting for the acceleration of the heart described in certain of the cases of human botulism.

The toxin is apparently not excreted in the urine, but may be demonstrated in the blood long after it has been injected.

On the basis of the experimental work, it is recommended that in cases of human botulism, when the respiration shows signs of failure, artificial respiration be instituted —if necessary, by means of bellows and a tracheal cannula. In dogs this procedure has given promise of success. The careful administration of physostigmine is also recommended.

Observations on the Action of Germanium Dioxide in Pernicious Anemia.

In the *American Journal of the Medical Sciences* for August, 1923, ALEXANDER states that the germanium dioxide, obtained from a reliable source, was employed in three cases of pernicious anemia. One of the cases was what might be called far advanced and the other two moderately advanced cases.

The diagnosis of pernicious anemia seemed certain in all of the cases. In one case it was verified at necropsy.

No clinical improvement was noticed in any of the cases, and the hemoglobin and erythrocytes showed no increase during the period of observation.

Arsenic and iron, administered hypodermically after the germanium was stopped, led to an increase of hemoglobin and erythrocytes, also to symptomatic amelioration.

In other words, he concludes that in pernicious anemia, germanium dioxide when administered by mouth and hypodermic injection led to no beneficial results.

Insulin in the Treatment of Severe Cases of Diabetic Acidosis with Impending Coma.

DIAMOND, in the *New York Medical Journal and Medical Record* of August 15, 1923, states that in insulin we have a substance that prevents coma and death from diabetes but does not cure the disease. It may help to restore the carbohydrate tolerance where an acute pancreatic insufficiency takes place. In such cases by giving a complete rest to the temporarily disabled pancreas, during which time the patient's life and health are safeguarded, the function of the pancreas may be restored to normal activity. This has not been observed in the adults reported in his paper.

Aside from coma, insulin is indicated only in those severe cases in which the ordinary dietetic treatment fails to bring a response and in those in which ketosis begins to develop. It has no place and should not be used in the moderate diabetic patient. Here the standard dietetic treatment gives satisfactory results. When used, it promptly restores the patient to a normal standard. Unlike thyroxin, the human economy behaves differently to this isolated internal secretory substance. While in the former, the intravenous injection of one mg. of thyroxin in a case of cachexia strumipriva will restore the metabolism to normal and will cause it to remain so for a period of two weeks, in the latter, unfortunately, its influence is only temporary; the iletin is promptly utilized in influencing mobilization and metabolism of the carbohydrates. The effect is temporary. With each combustion of carbohydrate a definite unit of insulin is consumed and therefore

the substance must be administered with every meal. Also, unlike the extracts of pituitary or thyroid, this substance cannot be administered by mouth as the digestive enzymes cause its destruction.

In the face of all these difficulties, however, do not let us dwell too long on the pessimistic phase, but let us be reminded of the pitiful and erstwhile helpless state of these patients and ask ourselves what would have become of them were it not for insulin.

The Skin and the Use of Cosmetics.

KLAUDER, in the *Philadelphia Weekly Roster and Medical Digest* of October 27, 1923, states that the government census figures show that during the last twelve months the women of the United States spent for face paint, including "beauty creams," skin bleaches, face lotions, and cosmetic powders, a sum of not less than fifty million dollars.

In the same period we exported to other countries about six million dollars' worth of such beautifying materials, the total including 3,652,604 pounds of toilet powders. England obtained from the United States 2,071,263 pounds of face creams and rouges in 1922.

The extraordinary recent increase in the use of face paint by the women of this country is illustrated by the fact that in the last eight years the production of cosmetics in the United States has been almost quadrupled. In 1914, according to census figures, it represented a total value of eighteen million dollars, at manufacturers' prices; in 1922 it was about seventy million.

There are many cosmetics which are harmless; for example: cold cream, vanishing cream, talcum powder, rice powder and the innumerable emollient lotions and jellies such as are used for chapped hands, and indeed rouge, provided it does not contain vermillion, which is a sulphide of mercury, the use of which on the skin is not to be recommended. However, the red color of most rouges is due to carmine, a relatively harmless pigment of crimson color obtained from cochineal.

On the other hand, there are innumerable cosmetics—skin bleaches, beauty creams, and face lotions—which are decidedly harmful not only to the skin but imperiling health. Many of these preparations sold with extravagant claims with a fancy name and fancy container for an extravagant price contain one or the other of the following poisonous metals: lead, antimony, mercury, bismuth. Of these ingredients, lead is the most dangerous. It is notorious that certain salts of lead have for years been responsible for cases of chronic lead poisoning due to their employment in cosmetics.

Poisons, recognized as such, are not allowed to be sold, save under the most rigid restrictions. But in the form of cosmetics they are freely marketed everywhere. Commonly, the manufacturers advertise them as "harmless" and the purchaser accepts that statement in full faith. It means nothing, however. Many of the preparations thus advertised have been found, on chemical analysis, to be the worst.

One well-advertised toilet cream sold for the alleged purpose of beautifying the complexion and rendering the skin soft and velvety contained by chemical analysis 42.5 per cent of lead carbonate.

The indiscriminate sale of preparations of this sort is not merely a menace to the public health but a commentary on the laxity of our laws. Any concern, responsible or irresponsible, can sell for the indiscriminate use of the girls and women of the country a cosmetic loaded down with poisonous ingredients, and they are not required to give any hint as to the potential dangers nor even to declare the presence of the poison.

The aphorism "do not believe everything you read" applies with particular force to the extravagant and unjustified claims in the advertisements of certain cosmetics. Labeling cosmetics as "skin food," "nourishes by absorption," "builds firm, healthy skin" is a misrepresentation of the facts. In the strict sense of the word there is no

substance which when applied externally acts as a skin food.

As pointed out in the beginning of this article the skin is an intimate part of the whole human organism, and as such is nourished by blood and lymphatic vessels. The health of the skin is, in a large measure, intimately associated with the health of the individual. Again, it is very doubtful if there is any preparation which when applied to the skin will help wrinkles to any degree; nevertheless there are many hundreds of cosmetics which are sold for the express purpose of removing wrinkles. Many of these contain cheap and relatively innocuous ingredients such as Epsom salts, perfumed, dyed pink, and sold under the name of wrinkle remover for an exorbitant price.

An Improved Protein Milk in the Diarrhea of Infants.

KERLEY and CRAIG, in the *Archives of Pediatrics* for July, 1923, state that in the use of protein milk in infant feeding the original method of Finkelstein and Meyer has been closely followed by the medical profession, varying only in the fat content. Fresh cow's milk had invariably been employed in its preparation. While this method has been of much service as a diet for infants with diarrhea, it has failed in many instances, particularly in the very young and delicate, whose need of nourishment is the greatest. For several years past they have been feeding malnourished infants most satisfactorily with evaporated milk put up after the prescription method by the Walker-Gordon Laboratory. These prescriptions have been employed in that type of case which is usually given a dried milk or a butter-flour mixture. The evaporated milk failed absolutely in the malnutrition cases with diarrhea, no matter how the fat and sugar content was manipulated. Hence a new method had to be devised for this type of cases.

At Kerley's suggestion, Mr. Fowler of the Walker-Gordon Laboratory made a series of experiments on the problem of preparing a protein milk, using the evaporated product for this purpose. It seemed that if so many marasmic infants could be fed on this product after the prescription method, the addition of the Bulgarian bacillus might render it useful in those of the same type with diarrheas. It was found that the eight hours' incubation period ordinarily used in making standard protein milk was unnecessary for the desired results, likewise that the addition of protein in the form of powdered curd was not essential. It was demonstrated that an incubation period of two hours gave a much more palatable mixture, which was taken very readily and rarely vomited; it relieved the diarrhea and produced a gain in weight. The two- and four-hour incubation plan was used in preparing the food for the series of cases reported.

In the preparation of the milk, a culture is used which is prepared as follows: One quart of skimmed milk is boiled for one hour, cooled to 90°, and divided into two equal parts. To one part one-half tube acidi lactici is added, while to the other part is added one-half tube of B. bulgarici. Both portions are incubated for eight hours at a temperature of 80°, then shaken well, cooled, and kept on ice. One-half tube is sufficient to inoculate one pint of starter, which will be sufficient for twenty quarts of lactic acid.

To prepare the protein milk, add one teaspoonful of each culture to one pint of evaporated milk and incubate for four hours to the degree of acidity required. Two hours' incubation is all that is necessary. As a result of the shorter period of incubation the mixture is more palatable, less acid, is rarely refused, and rarely vomited. A printed slip is placed on every package stating that the bottles containing the food are to be kept immersed in ice; this prevents a further growth of the culture.

Kerley presented a chart giving the data on 47 cases in which this form of protein

milk was used. The histories showed diarrheas of from twenty-four hours' duration to those extending regularly over a period of three months. In every case the treatment was continued subsequent to giving the initial dose. The average duration of the period during which these feedings were taken was nine and a third days. Of the 47 cases, 27 showed a gain in weight; 15 showed a loss, averaging 4.2 ounces; in 5 cases the weight remained stationary. In no case did the diarrhea fail to clear up.

After analyzing the details with reference to the caloric intake in these infants and the percentages of this intake in protein, carbohydrate, and fat, Kerley concluded that it was evident that the food described was one containing the protein requirements necessary for growth, with a rather low fat and with a high carbohydrate, which in general was made up of equal parts of starch and sugar. It was the high carbohydrate constituent which provided a high caloric value, and thus gave the infant during his diarrhea his normal necessary food requirements, using lactic acid milk as a medium, which is made from evaporated milk as a base. Every year, particularly in the autumn, Kerley said he had a large number of infants suffering from chronic indigestion in which diarrhea or a tendency to diarrhea is a prominent symptom. These infants were usually on a barley and skimmed milk diet in varying strengths. He had others that have always been difficult feeders, and those who had incompletely recovered from some acute intestinal disorder. In these patients the establishment of a thriving diet has not been difficult, and it is in these that the method presented has given the most brilliant results. It was not claimed that the scheme presented was a method of infant feeding; it is a means of temporary feeding for sickly delicate infants who are having a hard time. By this means it is possible to give a higher caloric, well-balanced ration which the patient is able to utilize; the diarrhea ceases and he gains in weight.

Treatment of Empyema in Infants.

In the *Archives of Pediatrics* for July, 1923, PORTER and MORRIS state that pleural drainage after thoracic incision, with or without rib resection, meets the demands of sound surgical practice in older children and adults, but those who have had much experience with this technique in infants have seen that it is far from satisfactory, and that its institution is followed by a heavy mortality, and they base this statement on the history in detail of 10 cases of empyema in patients under 20 months old. Likewise tube drainage is not satisfactory, since it often fails to accomplish its purpose, which aims to prevent collapse of the lung and at the same time to maintain negative pressure in the pleural sac, through the rigid exclusion of air from the pleura. The methods of Mozingo and Moschcowitz are rarely successful in the empyemas of infancy, though they have very definite value in the treatment of older children. One reason for failure of any method which permits collapse of the lung is undoubtedly the difficulty of its reëxpansion. In view of the fact that medical literature records that empyema is extremely fatal when it attacks children who are less than a year old, and that the general experience of pediatricians and surgeons who have dealt with empyema was not more happy than their own, they determined to test the more conservative method of dealing with pus in the pleural cavity of the very young. In spite of the warning of high authority that aspiration was objectionable, they felt that so simple a process deserved further trial, especially as it is now possible to make visual observation of intrathoracic conditions by the help of the fluoroscope.

In their series of ten cases, treated by repeated simple aspiration controlled and guided by frequent fluoroscopic observations, eight patients made complete recoveries and two died. In the eight patients healing occurred without the least pulmonary disability and without complications of any kind. In neither of the cases which ended unfavorably could it be said that the method of treatment was at fault. One of the patients

was moribund when seen and succumbed immediately after the first aspiration; the other fatality occurred in the case of an Italian child whose parents refused to follow medical advice. Certain of the patients were extremely ill. No set rule was followed as to the amount of pus removed at any one sitting, nor of the number of punctures nor of the length of the interval between them. At the first aspiration the practice has been to interrupt the withdrawal while the pus still flows freely in order that the child's lung should not be subjected to too sudden differences in pressure. If the pus flowed freely and the quantity was large, the aspirations were repeated daily until the amount that could be withdrawn was markedly diminished. After this the fluoroscope was invoked to determine the need for further aspiration and to estimate the amount of pus that ought to be withdrawn at the next puncture. The least number of punctures needed in this series of cases was three. From his experience Porter believes there is no advantage in the use of Dakin's or any other antiseptic solution. A simple salt solution is quite as effective when there seems to be need to attenuate a viscid pus.

It has been stated that all the pus cannot be removed by aspiration, but this objection overlooks the fact that repeated removal of a major part of the pus can be followed by an entire disappearance of toxic symptoms and by a prompt restoration of lung function, a result rarely accomplished for the young infant by the open method, or the semiopen method. A further warning has been given that it is impossible to clear away large fibrinous masses by aspiration. As a matter of experience these masses are not often embarrassments to aspiration except in the treatment of long-standing cases. Such masses are more often present as the result of the entrance of air or of secondary infection brought about in the open or partially open methods of drainage than of the usual pathological processes of empyema. The danger of producing pneumothorax is more interesting from the academic than from a practical point of view. Even if a bronchus be punctured little air can enter the pleural cavity through the very small opening made by the aspirating needle in a lung whose elasticity is but slightly impaired.

The authors' experiences led them to believe that while for infants over a year of age who are vigorous and lusty, the bottle siphon method is the mehod of choice in treating empyema, and while the open drainage method of treatment is undoubtedly to be preferred for children of two years and up, in dealing with the empyemas of infants who are quite young or who are weak from nutritional disturbances or from other diseases, multiple aspiration is the treatment much to be preferred, provided it can be controlled by frequent fluoroscopic observations.

The Operation of a Breast-milk Dairy.

In the *Archives of Pediatrics* for July, 1923, CHAPIN reiterates that the most feasible and practical way of reducing infant mortality during the first year lies in encouraging maternal feeding. The possibilities of the human breast under proper control have been emphasized by Sedgwick and his colleagues. With suitable care and manipulation, results can often be obtained that are little short of marvelous. Heretofore the only practical way of furnishing breast milk for a baby needing it, and deprived of it, has been to procure a wet nurse. As is too well known the difficulty of this problem is manifold. It is hard to get the nursing woman, hard to manage her when she has been secured, and often hard to settle the problem of her own baby. In recent years the plan of removing the milk and furnishing it apart from the mother offers a promising solution of this question. It has likewise been found that in many cases a little breast milk, in addition to the bottle, will have a most favorable effect. Human milk, or a combination of this milk and cow's milk, will prove especially beneficial in premature babies, or

those born at term, during the first few weeks of life, and in cases of marasmus. When we consider that the heaviest infant mortality occurs during the first month and that heretofore all efforts to reduce this mortality have materially failed, although fairly successful after the first month, the great importance of breast milk during the early weeks becomes apparent.

In 1910 Talbot started an experiment in collecting and supplying breast milk in Boston. Ten years ago Hoobler, acting on this idea, began furnishing breast milk with the coöperation of the Social Service Department of Bellevue Hospital. The best method of handling this work is to have it linked up with a maternity hospital. In Detroit, the Woman's Hospital and Infant's Home, under Dr. Hoobler's direction, has successfully accomplished this endeavor. In the absence of such an undertaking in New York, the directors of the Children's Welfare Federation started an experiment in 1921, aiming to procure and distribute a certain amount of breast milk to aid in critical cases. The health stations of the Department of Health are utilized in procuring the milk. It is here attempted to secure for a nominal price from a given number of mothers a quantity of breast milk that may be employed in supplying hospitals and private homes caring for premature or weak babies. At first each mother was visited daily and the milk taken in her own home. It was found that there was a tendency for the mothers to have the milk ready when the visiting nurse arrived. It became more and more difficult to insist on the regulation that only milk expressed before the worker could be used. It was therefore decided to change the method of collection by insisting that each mother willing to sell her milk should come into the health station, only a few blocks from her home, where a matron was installed. No milk is now taken unless it is expressed in the station. The time is left optional with the mother. The matron is at the station until all the mothers have come and the orders have been filled. She is kept busy instructing and supervising mothers, sterilizing the bottles, keeping records, and filling orders. In the late afternoon she goes to visit new mothers to work up her clientele. As it did not seem possible to secure a sufficient number of mothers from any one health station, arrangements have been made to secure the coöperation of nurses in neighboring stations. Only mothers having more milk than is needed by their own babies are used. Their babies have to be under the care of a doctor and nurse in the health station, and the case has to be recommended by them. All the milk is pooled and put in large bottles on ice.

During the past year 32 mothers have sold their milk under this plan. One mother gave as much as forty ounces a day and supplied milk for eleven months. It has been found that lactation may be prolonged for fifteen to eighteen months, and that the composition of the milk between the ninth and eighteenth month varies very little from that produced between the sixth and ninth month. Every one buying milk from the Children's Welfare Federation is required to pasteurize the milk before use, as no Wassermann test has been made on the mothers.

Assays of the pooled milk have been made at intervals of a few months at the Babies' Hospital. The specific gravity of four different mixed specimens was 1029, 1030, 1038, 1024. As to fat, five examinations gave the following percentages: 4.25, 3.4, 3.9, 3.8, and 4. For protein, four examinations showed: 1, 1.2, 1.49, 1.48. In three examinations the probable sugar reached 5.7, 7.09, 6.7. From October, 1921, to April, 1923, a period of eighteen months, 36,266 ounces of mother's milk have been collected and sold at cost. The milk costs 13 cents an ounce, 10 cents being paid to the mother, and overhead charges are three cents. It is sold for 15 to 20 cents an ounce, according to the means in private cases, and to hospitals for 10 cents an ounce. It will be possible to collect twice the amount of milk at the same expense

when the work is better known and more mothers are secured. The service can be improved and developed as soon as the experiment is given more publicity and has secured the coöperation of maternity hospitals. Every locality having a maternity hospital or a community health center should inaugurate a similar undertaking. It has been found that human milk can be as advantageously fed from a bottle as directly from the breast, and that any period of lactation can usually fit a baby at any age. It is especially during the first month or two that infant mortality may be materially reduced by this kind of effort.

The Treatment of Syphilis Afloat.

FERGUSON, in the *Journal of the Royal Naval Medical Service* for July, 1923, and reprinted in the *United States Public Health Service* of August 20, 1923, states that the treatment of syphilis on board ships without having recourse to hospital treatment would appear to be solved by the introduction of sulpharsenol, which has now been under trial in the Mediterranean Fleet for the past two years.

It fulfils all the requirements of the efficient treatment of this disease, irrespective of where a man may be serving, and it is recommended that it should be issued to all ships, as has been the case on that station, for the following reasons:

1. When given subcutaneously the results obtained are at least as good as with any other drug that has hitherto been used.

2. The ease and safety of its administration on board; it requires no nicety of technique nor special apparatus.

3. It provides a method of treating the infection at the very commencement and before it has become generalized.

4. It provides for the continuity of treatment, which is so essential and which is now so often interrupted by the absence of facilities and the necessities of drafting.

To elaborate these points further, Surgeon Commander Scott has examined the results of treatment by sulpharsenol in that fleet and is quite satisfied, as the genito-urinary specialist of the fleet, that it is an efficient preparation and quite capable of taking the place of novarsenobillon in ships, and Ferguson will not say more except that it has given uniformly good results in his ship, where most careful Wassermann records have been kept.

Of course, to assess the value of any drug, the treatment which the patient has received before must be taken into account, but when a patient has been drafted to a ship with a plus Wassermann or is recommended a further course of novarsenobillon he has been treated with a course or courses of sulpharsenol on board, and the results have been uniformly good.

With regard to the ease and safety of administration on board there can be no question, for it amounts to no more than an ordinary inoculation against typhoid; it is painless at the time of injection, and only occasionally has there been any semblance of a "sore arm" following an injection; the latter point is important, for men will not submit to continue treatment over a long period if it causes pain or inconvenience or is likely to interfere with their ordinary pursuits on board or on shore.

Sulpharsenol requires no preparation of the patient before injection, except perhaps a purge the night before and the testing of the urine, and only as a precaution are patients kept in the sick bay on the day of injection, when, if there is no rise of temperature in the evening after an injection in the morning, they return to their ordinary duty.

With regard to the preparation of the compound for injection, all that is required is a syringe, preferably with a platinum needle, and some distilled water. The drug is supplied in ampoules of 0.48 and 0.6 gm.; the neck of the ampoule is broken off and 10 minims (0.65 cc) of water is added to the ampoule; the drug is readily soluble and the solution is ready for injection. According to the pamphlet issued with the drug, distilled water is not considered necessary, but as distilled water is always obtainable on board it is as well to use it.

The injection is made subcutaneously into the arm, care being taken that none of the solution runs along the track of the needle on withdrawal.

The speed and ease with which a number of cases can be dealt with are points in its favor. Some hundreds of injections have been given in his ship, and in most of the others on this station, and there have been no complications beyond an occasional evening rise of temperature and a solitary case of jaundice and possibly a case of dermatitis, 90 per cent of the cases returning to duty the same evening.

In has not the same shock effects as novarsenobillon administered intravenously, and therefore there should be no bar to its introduction for use in all ships, as has been the case in that fleet since its introduction by Surgeon Commander Kilroy, and Ferguson is sure all medical officers in the Mediterranean in the past two years will indorse the opinion that it is a safe and valuable remedy that can be used for service afloat.

The fact of having a drug on board for the immediate treatment of all sores is of great importance, for cases need never proceed to the stage of a positive Wassermann.

All ships on the station, with the exception of one or two, have microscopes with dark-ground illumination for carrying out the spirocheta pallida test, and if the latter proves positive treatment is commenced straight away. There comes the question of dealing with cases in which the spirocheta pallida test is negative; it is not an infallible test even when carried out by a highly skilled bacteriologist, and though no spirocheta pallida may be seen, the case may yet be one of syphilis. Are we to wait for the diagnosis to be clinched by clinical signs or a positive Wassermann?

Sulpharsenol is equally effective in rapidly healing chancroid cases.

A venereal sore with even the slightest chance of its being syphilis, in Ferguson's opinion, should be treated at once as potential syphilis and receive a course of arsenic, for now that we have a compound which is so easily and safely administered, and with such good results, it seems wrong to delay.

It is only by catching these cases in the earliest stage, say in the first week after the appearance of the sore, that we can guarantee that they will not have a positive Wassermann.

Two or three spirocheta pallida tests should always be made, and if positive two full courses are given, and if, as Surgeon Commander Scott suggests, the injections are given weekly instead of fortnightly so much the better.

As given in his ship a course consists of six injections of 0.48 gm. and two of 0.6 gm. given fortnightly, the course lasting fourteen weeks. If the test is negative, a prophylactic course of six injections is given, with a Wassermann test at the end of three and six months as a check. To quote Scott, there have been 72 of these cases treated in this way in the fleet, all of which had negative Wassermanns at the end of three months, and one wonders how many of these would have had positive Wassermanns if left untreated in the very earliest stage.

With sulpharsenol there is not the objection that one is needlessly subjecting a patient to the possible dangers of an intravenous injection, for experience has proved it is absolutely safe, and if the case is fairly put before the patient he rarely refuses to submit to the prophylactic injections, and no case of refusal has occurred.

It may be urged that the cost of treating all undiagnosed sores would be excessive; but when it is considered that treble the number of injections may have to be given if a patient gets a positive Wassermann, added to the cost of the patient's treatment in hospital, besides the loss of his services, the final cost of his treatment will far outweigh the initial cost of the prophylactic treatment.

With regard to the continuity of treatment, this again is assured by having sulpharsenol in the ship; many cases are drafted to foreign stations and to single ships on detached service with a recommendation for a further course of treatment; fre-

quently this cannot be given up to time, owing to ships being away from their bases for prolonged periods; by the introduction of sulpharsenol there can be no excuse for any case not receiving treatment at the proper interval.

To sum up, without in any way wishing to put forward exaggerated claims for sulpharsenol, Ferguson believes we have at hand a drug which if issued to all ships at least provides early, safe, and effective treatment on board, and a means of continuing treatment when away from the usual facilities available in hospitals and depots.

Goat's Milk in Infant Feeding.

A report by the Haedtler Goat Milk Dairy Farm of Chicago, in the *Chicago Medical Recorder* for August, 1923, states that during the summer-time it is customary for physicians to prescribe boiled cow's milk to guard against diarrhea. This is usually done whenever cow's milk is suspected of being contaminated with bacteria, and also when breast milk is unobtainable and the baby is fed on artificial food for the first time. Boiled cow's milk produces a more flocculent and digestible curd, and it is believed that the heat destroys the bacteria. Within recent years it has been noted that the boiling of milk greatly diminishes the vitamins, with the result that infants that are fed upon boiled milk for a prolonged period are often below weight, and both scurvy and rickets are liable to appear. This is especially true in the outlying districts where the mother lives too far away to visit her physician frequently in order that he may examine the baby from time to time to detect any signs of malnutrition.

As the goat is a very small animal very little space is needed for taking care of her; also, a goat is very economical to feed. The feed of six to eight goats will cost less than the feed of a single cow. Whenever it is possible, and provided the family has accommodations for a goat, it is an act of good judgment for the physician to advise the family to purchase a milk doe and thereby be assured of obtaining perfectly fresh milk that it is unnecessary to boil, and which therefore contains the full potency of vitamins.

Goats may be transported a distance of several hundred miles in crates, the same as pet dogs, at very small expense. It is not an uncommon sight in these days to observe families, who are driving by automobile to country resorts, build a little wicker crate and carry the goat on the running board along with them. On arrival at destination it is always a simple matter to find food for the goat at any country resort or camp, as the little animals can subsist on the leaves of brush wood and twigs, weeds and grass, which is always found in abundance in any rural district. A large part of the enjoyment and happiness of any summer vacation rests upon the assurance that baby is always certain of his fresh milk supply and that there is no danger of feeding the baby on purchased milk, the cleanliness of which is unknown and doubtful. Moreover, the baby is always assured of having more milk than he could possibly utilize since the average little goat will give from two to four quarts per day; and whatever milk is not needed for the baby can be consumed by the family.

The average goat breeder is an intelligent person, and inasmuch as the principal outlet of goat's milk is for infant feeding purposes, every care and precaution is taken to insure cleanliness. *The Goat World*, a printed journal issued exclusively for goat breeders, constantly refers to the necessity of cleanliness, and in almost every issue recommendations for sanitary dairy technique are published. This subject has been given very great prominence, for the reason that the goat breeders realize that it is to their interest to embrace and practice every scientific suggestion in order that they may approach physicians in an intelligent manner and meet their requirements.

The goat is a very clean little animal and

seldom acquires enteritis like the cow. The manure of the goat is dry, consequently the goat's droppings seldom touch the udder and teats. This is quite a contrast to the cow, whose manure is usually a semiliquid that is dropped or splashed by the cow's tail on to the udder and legs of the animal, where it finally dries in cakes. Particles of this manure are bound to drop into the milk pail, thus infecting the milk with virulent bacteria. If the physician would critically examine any cow dairy he would observe many cows with stained flanks and udders as the result of uncleanliness. Contrast this with the goat dairy, and the physician will be gratified to notice that the little animals are just as clean and sleek as well-kept pet dogs.

The goat breeders take pride in their goats. Do not confuse their animals with the common so-called "nanny-goat." On the contrary the goats used for the purpose of obtaining milk for infant feeding purposes are Swiss Saanens and Toggenburgs, or the Anglo-Nubians. The original sires and dams for the foundation of this stock were imported from Switzerland, England and Egypt at great expense. Almost any goat breeder would be glad to give an account of the history of his goats, all of which would be found interesting to physicians.

Physicians will find no difficulty in modifying goat's milk, as the analyses given in this pamphlet would indicate that the milk should be diluted in practically the same manner as whole cow's milk. Consideration should be given to the fact that goat's milk (like cow's milk) contains less sugar than human milk, and therefore, when goat's milk is diluted with water to reduce the protein, the sugar deficiency must be made up with some carbohydrate, preferably dextri-maltose No. 1, as the combination of goat's milk, water and dextri-maltose gives particularly gratifying results.

Goat's milk is neither a fad nor a fancy. The number of physicians who own their own goats is increasing. This would indicate that medical men are quick to appreciate the value of goat's milk as a food for both infant feeding purposes and for family use. These physicians credit the milk as being the most easily digested by both babies and adult convalescent patients, and quite a number of physicians prescribe goat's milk for tubercular patients on account of the fact that it is a food of nutritional value that is well borne by this type of patient, and because it is well known that the goats themselves are considered immune to tuberculosis.

Ipecacuanha in Chronic Digestive Troubles of Children.

The Practitioner for August, 1923, in its "Practical Notes" in referring to this subject, states that apart from acute gastro-enteritis, there is often noticed a series of intestinal troubles which specially affect older children, and are remarkable by their tendency to become chronic and their retarding effect upon the general development of the child. Rousseau-Saint-Philippe states that the clinical picture is nearly always the same in these intestinal cases: there is almost complete loss of appetite, bulimia is exceptional; the tongue is dry and coated; the breath smells strongly of acetone; constipation is obstinate, but interrupted from time to time by diarrheic attacks; the stools are hard, decolorized, and chalky, except when an attack of diarrhea occurs, when they become mucilaginous, glairy, blood-stained, and horribly fetid.

The use of cholagogues, rather than a diet of bouillons and vegetables, will yield real and lasting effects, and among the drugs ipecacuanha appears to be the best. Saint-Philippe gives the tincture of ipecacuanha and begins with small doses. At first one drop morning and evening in a little sugar and water; a teaspoonful taken from half an hour to an hour before each of the two chief meals, but never on an empty stomach in the morning. The dose is increased by a drop morning and evening each day until the amount is reached, ac-

cording to age, of five, ten, fifteen or even twenty drops morning and evening, a total of forty drops in the twenty-four hours.

Bérard, in order to prolong the effects, gives decreasing doses once the maximum has been reached. Intolerance has never been observed, vomiting is not induced, and it is very exceptional to find nausea produced. In the interval between the courses of ipecacuanha, Bérard gives older children keratinized pills of bile.

Ipecacuanha in small doses can be given as well to bottle-fed babies, in order to correct the drawbacks of artificial feeding, the "normal dyspepsia" of the bottle-baby, as Saint-Philippe calls it, and to guard against, as much as possible, the acute gastrointestinal attacks which so often complicate that method of feeding. The tincture of ipecacuanha is prescribed for these nurslings in the following way: During the first three months it is given one drop before each meal in a teaspoonful of sugar and water, that is to say, six to seven drops at most, during the day. At the end of three months, three drops are given four times a day, and finally after weaning, if it is necessary, five drops four times a day with intervals from time to time. The stools improve, the meteorism and constipation disappear, the appetite and general condition become better, and, an important fact, these children are much less subject to attacks of gastro-enteritis.

Surgical and Genito-Urinary Therapeutics

Conservative vs. Radical Obstetrics.

De Normandie *(Boston Medical and Surgical Journal,* June 28, 1923) states that the average physician ought to be able to tell whether the average patient has started in labor, yet there are many cases showing definite and regular contractions, not infrequently with some blood-stained mucus being present, that show no alteration of the cervix. In true labor the cervix always shows some changes, it softens, it dilates; but in false labor no change takes place. Unless the condition of the cervix is recognized, we immediately start the patient on the wrong trail. We lose our perspective, think up many possible complications, jump from conservatism to radicalism, and determine that something must be done. The patient is then subjected to the insertion of a hydrostatic bag, or, what has happened, a Cæsarean is done or is suggested. The only thing, however, that is indicated is that we give that patient a good, lasting sleep, and that is best obtained by a sufficiently large dose of morphine subcutaneously combined with chloral hydrate by rectum. The patient obtains the much-needed rest, the family is reassured. A few days later, even ten days or two weeks, she again starts up, and the cervix shows the alteration that we expect.

To the average sized woman in first-stage labor, yet making little progress, from one-sixth to one-quarter grain of morphine should be be given, combined with 10 grains of chloral hydrate by rectum. At times scopolamine is helpful. These patients then sleep soundly between pains. When the patient dilates to one or two inches, and even in the presence of fair to good labor ceases further progress, and when the membranes have or have not ruptured, one of two procedures is justifiable: If the os is definitely rigid, under gas and oxygen anesthesia a bag of the Voorhees type, but larger, is inserted. If the cervix is not rigid, under anesthesia it is dilated slowly to three or more inches. The patient is allowed to go into labor. As an analgesic in the long-drawn-out first stage gas and oxygen are to be preferred. If the patient ruptures the membranes before any pains are evident the waiting policy is still wise unless pains start up and dilatation fails, when the insertion of a bag is indicated.

As to the second stage, the author is

opposed to forceps or version, excepting when special indications are offered. An eclampsia means some one has blundered. It may not be the physician, it may not be the woman; it may be either. Until we impress upon the women of the country that medical supervision of their pregnancies is absolutely essential, we shall continue to have large numbers of eclamptic cases. And having them, the question of how to treat them will be debatable.

Any woman who gives the history of bleeding in the latter three months of pregnancy should at once be put to bed and a careful abdominal examination should be made. If the abdomen is normal for the period of gestation that the patient says she is in, if she is without pain, without tenderness, then she should be examined carefully by vagina under aseptic precautions. If the bleeding for which the cause is sought is anything but a mere show, then preparations to meet a possible severe hemorrhage consequent upon this examination must be at hand.

If in these bleeding cases we carry out a definite routine of examining them carefully and do not minimize the bleeding, then our results will improve. One additional safeguard should be at hand: in every hospital center there should be on call a number of Group IV donors that can be obtained for purposes of transfusion. If this is not feasible, then if the bleeding is at all serious, suitable blood should be found from the patient's immediate relatives or friends. Whether the suggestion of typing each and every pregnant woman because of the possibility of a transfusion becoming necessary will become general the author does not pretend to say.

Now a word about the cardiac cases—a word of warning. Above all other classes of cases they are apt to have easy deliveries. A serious cardiac, especially a primigravida, undoubtedly will stand a Cæsarean section better than a long hard labor with difficult delivery superimposed. The distention that so frequently follows a Cæsarean may prove to be a serious embarrassment to the heart action.

As to the third stage of labor, the author believes the hurried forcible expulsion of placenta can do only harm. If there is no bleeding there is no hurry.

Pituitrin should not be used when there is any resistance to be overcome. It never should be used unless the presenting part is in the pelvis, and the initial dose should never be more than a third of an ampoule.

The important point in the management of any obstetric case is that each one should be individually studied—that we see to it that each patient has efficient prenatal care in its broadest sense. It is by this study that we can manage our cases intelligently, and it is only by this means that we can reduce the unnecessary mortality that is present in obstetrics. The toxemias, including eclampsia, the bleeding cases and sepsis make up nearly fifty per cent of the maternal deaths that occur throughout the country. A careful study of each individual case will prevent many of these deaths. By this study we then can deliver each and every woman by a well-chosen method—operative if the indication is present, nonoperative if a real indication is not present. If we are going to reduce our deaths from sepsis we must call a halt on this wave of "meddlesome midwifery" that is now rampant everywhere. If we are going to recommend that every woman be delivered by operative means, the whole teaching of obstetrics in our medical schools must be recast. As it is, the young practitioner is thrown on the public with next to no training in operative obstetrics. The deaths now from ill-advised, bungling operative work are too frequent—what will they amount to if the advice of some obstetricians is followed?

Painless Labor.

RAIFORD (*Virginia Medical Monthly*, June, 1923) discusses in this paper only methods which are available to the general practitioner, for which reason he does not consider twilight sleep and nitrous oxide, since these require skilful observation; and the latter complete apparatus and one who knows how to manage it. He believes the

first step in insuring painless labor is to secure the confidence of the patient by being competent. During the first stage he has most confidence in chloral, morphine, or morphine-scopolamine combined. The latter part of the first stage he speaks encouragingly of a little chloroform or ether if the pains are severe and the os is rigid. At the beginning of the second stage he suggests the giving of a general anesthetic with each contraction of the uterus, just enough to relieve the sharp edges of the pain, but not enough to retard labor. This should be kept up until the head is well down in the perineum, when it should be pushed to complete anesthesia, allowing the baby to be born without the consciousness of the mother.

By the careful use of chloroform or ether and pituitrin, if necessary, we will in most cases be able to perfect delivery with the mother so thoroughly anesthetized as to be unconscious of the fact that the infant has been born. Often, too, the placenta can also be delivered before complete consciousness is regained, and it is not unusual for the mother to ask, after she has been dressed and fixed up nicely in a clean bed, how long it will be before she will get through.

Insulin and Its Use in Surgery.

An editorial dealing with this topic *(International Journal of Medicine and Surgery,* July, 1923) states that the chief aspect of the new remedy which requires repeated explanation is not so much its potency and efficiency but rather its limitation. Obviously it does not cure. Much as the administration of thyroid preparations in sufferers from hypothyroidism enables them to carry on while a suitable amount of the active principle is present in the circulation, secretion of the isles of Langerhans maintains the balance of the sugar metabolism by changing the sugar or preparing it in such a way that it can be assimilated by the tissues. Naturally, this artificial "normalcy" obtains only while sufficient of the active principle is available. For this reason it is necessary to keep up the supply of insulin by periodic injections. So far no substitute has been discovered for the hypodermic method of administration. Numerous extensive investigations with oral and rectal methods of treatment have shown that insulin is not absorbed or, at least, that it loses its activity altogether during its passage through the intestinal tract.

The uniformly good results obtained with insulin by the numerous observers in Europe as well as in America justify the statement that diabetes has been robbed of its terror and that its worst features can be successfully combated. As a contemporary put it tersely, the "di" has been taken out of diabetes. This is, of course, of special interest to the surgeon, for in the less happy days, now fortunately past, surgical complications were the commonest direct cause of the fatal termination of diabetes next to attacks of coma. Already a routine procedure is crystallizing out of the practice of surgeons to have the metabolism of their diabetic patients studied immediately before undertaking operative measures. According to the degree of hyperglycemia and the alkalinity of the blood the need of treatment with insulin can thus be determined.

Since diabetic patients as a group have always been found the worst possible surgical risks on account of their diminished powers of recovery and resistance against infections, the increased therapeutic possibilities mean much for the surgeon, the more so as diabetics show a greater incidence to surgical complications than any other class of patients. Among the many conditions requiring surgical treatment, acute forms naturally carry the worst prognosis because of the severe tax imposed upon the patient as well as because of the impossibility of adequate preparation. As instances of such conditions reference may be made to acute gangrenous appendicitis or strangulated hernia. Here the supervention of severe acidosis and coma is but too frequent and a danger which must always be reckoned with and clearly explained to the relatives of the patient.

Similar concern must be felt even in sub-

acute conditions where the element of infection enters, on account of the notorious lack of resistance of diabetic tissues. However, in such cases there is usually time for the institution of insulin therapy, though it appears that undue optimism is still out of place in the presence of virulent sepsis.

The best chances for success are, of course, found in chronic complications, such as tumors, where the time of the operation may be determined by the general condition of the patient.

Another point of greatest importance in all diabetic patients is the choice of anesthetic. Probably there is no longer any difference of opinion in this respect. Chloroform is strictly contraindicated on account of its toxic action on the liver cells and other tissues. Ether, especially when administered by the open method, is less objectionable. The ideal anesthetic, however, is undoubtedly nitrous oxide and oxygen, while for minor operations local anesthesia may be employed.

In conclusion it must be emphasized that the diabetic remains an undesirable surgical risk in spite of all recent refinements of treatment. Though the mortality figures have been radically changed, it is still necessary to avoid undue optimism. Above all, it is just as essential as ever to neglect no means at our disposal for improving the general resistance of the patient and for raising the efficiency of his sugar metabolism. It cannot be stated too often that dietetic measures continue to be of the greatest importance and to constitute the chief means of controlling the patient's condition.

Puerperal Morbidity.

ENO (*Surgery, Gynecology and Obstetrics,* June, 1923), basing her conclusions on a study continued for fifteen years, and upon 7000 case records, announces the following conclusions:

Total morbidity was 8.6 per cent in house and 2 per cent in out-practice cases.

Morbidity was nearly twice as common in primiparæ as in multiparæ.

Total morbidity percentages have shown a steady decrease by five-year periods both in house and on out-practice.

Total mortality from puerperal sepsis was 10 in 10,000 cases.

Morbidity in non-operative cases was 5.5 per cent of cases delivered in the house and 1.6 per cent of out-practice.

There was definite increase in morbidity among non-operative cases in primiparæ as compared with multiparæ, and the influence of long labor and repeated vaginal examinations can be traced.

There is either bacteriological or definite clinical evidence of gonorrhea as an etiological factor in puerperal infection in 36 per cent of the primiparæ and 20 per cent of the multiparæ.

There is a large class varying from 33 to practically 75 per cent of the total patients in whom the course of the reaction was very mild and for which no definite etiological factor could be found.

Morbidity percentage has shown a steady drop by five-year periods in non-operative cases, both in the house and on the out-practice.

Mortality rate has been 2 in 2886 house cases and none in the out-practice, non-operative.

The percentage morbidity in cases in which operative procedures were used was 22.9 per cent in the house and 8 per cent on the out-practice.

The incidence of postoperative morbidity was from two to four times as great in primiparæ as in multiparæ.

The drop in the incidence of postoperative morbidity has been less than that of non-operative morbidity, but has occurred.

The operative procedures as to morbidity incidence show the following sequence: intra-uterine douche; version and extraction with craniotomy; manual removal of placenta followed by some other procedure; Cæsarean section; version and extraction; high forceps; mid-forceps; breech extraction; low forceps; manual removal of placenta; insertion of bag. The sequence on the out-practice is practically the same.

The operative procedures which have been followed by fatalities have been the more serious prolonged type, and multiple procedures have been common.

Sinus Headaches.

ALLGAIER *(International Journal of Surgery,* June, 1923), after a discussion of the anatomy of the sinuses, observes that the headaches resulting from inflammation of these cavities may be divided into two distinct classes, namely, the acute and the chronic, and it is the latter class that causes us the most trouble.

The acute cases generally give us the history of an ordinary cold, or influenza, or pneumonia, or one of the exanthems, or some other infectious disease. These acute headaches may come on at the height of the disease itself, or after the symptoms have subsided. The patient may have had some infectious disease and considers himself entirely well, and suddenly he develops head symptoms which point to a sinus involvement. The headache and pain are generally located over the sinus involved. If the maxillary sinus is affected the patient will usually have some neuralgic pain over it or about the orbit. The headache is worse upon stooping and is not generally severe as in frontal or sphenoid involvement. There is a feeling of distention or pressure in the check and also some tenderness upon pressure. Acute frontal sinus infection gives rise to more pain at the start; this may be directly over the sinus, but if the infection continues, the pain will radiate to the temporal and occipital regions. There may also be some dizziness and vertigo.

Acute ethmoid pain is generally tense in character and more marked in the region of the nasal bones, below the eyes, and may radiate toward the temples.

The pain of acute sphenoid involvement is more severe in the parietal and temporal regions and may radiate to both ears and to the muscles of the neck.

With other symptoms presenting in the nose and from the history we can usually diagnose acute involvement of the different sinuses, but it is chronic sinusitis that is hard to diagnose. Here the symptoms are vague and often inconstant and variable as to their location. Frequently we cannot make a positive diagnosis as to which sinus is involved. This is accounted for by the fact that they are supplied by the same nerve with its numerous small ramifications, thus producing referred pains or aches. But one characteristic symptom is generally present in chronic sinus involvement, and that is some ache or pain in some part of the head. As an individual symptom indicative of a particular sinus it is unreliable, but in connection with other symptoms is of great value in making a diagnosis.

In chronic headaches we generally try to find out the location of the ache, and determine whether it is deep or superficial, frontal, parietal or occipital, severe or mild, its time of appearance and duration, whether it is ameliorated or made worse by a change in the position of the head. In chronic maxillary sinus infection the pain is not generally present upon arising, but comes on about 10 or 11 A.M., and lasts until the patient lies down. This is familiarly called "sun headache," and is due to the maxillary sinus draining itself at night when the patient is in a recumbent position; when he arises the sinus refills itself. In chronic frontal involvement it is just the opposite; the patient has headache in the morning on arising, and this abates when the sinus empties itself after he has moved about.

All sinus headaches are made worse by smoking, constipation, alcohol, exertion and bending over, and they are relieved if the nasal mucous membrane is contracted by inhalations or cocaine and adrenalin applications, thus allowing the infected sinus to drain itself.

As to each sinus producing a pain or ache in a certain region of the head, this is the exception and not the rule. What a blessing to the doctor if it were the rule! However, individual sinuses seem to show some predilection in causing an ache in defined areas. Thus, a dull pain or ache between the eyes points to ethmoid disease.

Pain over the maxillary sinus and over the eyes points to the antrum. Chronic frontal trouble generally manifests itself in the frontal region high up, while severe pain in the parietal and occipital regions points to the sphenoidal sinus.

These localized pains and aches, together with the presence of pus in the nose, an inflamed condition of the nasal mucosa, an enlarged and swollen middle turbinate bone, and a history of chronic colds and dizziness, are the most common symptoms presented to us by patients suffering from sinus trouble.

Epilepsy as a Curable Disease.

MICHAEL *(The Journal-Lancet,* July 15, 1923) states that on January 1, 1920, 14,937 epileptics were housed in special institutions. He believes there are twenty-five times as many epileptics at large, and he states that the incidence rating of epileptics equals that of feeble-mindedness. Army rejections because of epilepsy were 3.7 in 1000; in grade-school children about 1 in 1000; in juvenile delinquents about 1 out of 100 shows the presence of epilepsy. About a quarter of the feeble-minded are epileptic. Direct heredity is rare, not over 5 per cent. Neuropathic history fairly common, from 30 to 50 per cent. Trauma of the head is undoubtedly an exciting cause. The author in 100 cases of head injury found that 36 were suffering from epilepsy. In one colony 11 per cent of cases had infantile cerebral palsy. In about 60 per cent no cause could be assigned. About one-third have their onset during the first decade of life; over three-fourths begin before the age of twenty. Less than 5 per cent have their first attack after forty. Idiopathic forms mostly begin on or after puberty up until about the age of thirty.

Morse, following the histories of 107 cases of spasmophilia in children, found that after reaching adulthood 10 per cent of these were feeble-minded and about 10 per cent epileptic.

Epileptics rarely live to be over fifty years of age. The average age at death is twenty-nine. About one-quarter die from status epilepticus and another quarter from pulmonary complications and tuberculosis, and one-eighth die of accidents. The United States Census Bureau gives three per cent of all deaths caused by epilepsy. Of the idiopathic cases from 5 to 10 per cent get well; of all cases about 20 per cent to 25 per cent recover, or are arrested. In institutions where the most hopeless cases are congregated, very few get well. The grand mal type is most amenable to treatment, the petit mal less so, and the psychic epilepsy is the most intractable.

As to the general management of these cases an outdoor life allowing fresh open air with free activity, preferably on a farm, is most advisable. There irksome influences of the "herd" are avoided. Autointoxication and exogenous intoxications are guarded against.

Foci of infection in the teeth, tonsils, sinuses, etc., must be removed. Indeed, all determinable bodily deviations should be treated. Emotional life should be without strain. Avoidance of hazardous situations (driving automobiles, handling machinery, rowing boats alone, etc.) is emphasized. For drugs the bromides or luminal are depended upon; sometimes both are administered. Meat and eggs are removed from the diet. Salt is also advised against in bromide therapy. Medicinal therapy is only a small part of the treatment.

The colony treatment is the best solution for cases with frequent attacks. General management can be more effectively applied, and hygienic and specific therapeutic measures carefully supervised. The excitements of extramural life do not exist here, and seizures cause little embarrassment. The demented types are cared for, of course, in hospitals for mental cases.

But a great percentage of epileptics really are in many respects able to carry on on the outside with some help and guidance. Occupations should be selected. Agricultural or allied pursuits are the most desirable because of isolation and absence of hazards, as mentioned above. Of about 300 ex-service men about 45 of the most favorable

cases were placed in training before the difficulties of vocational adaptations were fully realized by the government. However, about half of these in training are reported to be making satisfactory progress, a third are doing very poorly, and the remainder are holding their own with much difficulty. Of 36 cases following head wounds, one-third are making fair progress, one-third cannot even sustain themselves, and the other third can do some work at times, but need the continued support of their families or the government. Not a small number of dispensary cases are getting along fairly well in an occupation while they are under treatment. Certainly, the vocational problems are quite difficult to meet for epileptics in the community.

Sociologically, the advisability of marriage in epileptics is important to consider. The personality changing so frequent in these patients has a serious effect on the partner, making congenial married life often impossible. Excitements and responsibilities tend to increase the seizures in the patient. The liability to neuropathic offspring in approximately one-third of the progeny alone is a contraindication to marriage; therefore in nearly all cases marriage should be advised against.

The Clinical Use of Oxygen.

RETHWILM (*California State Journal of Medicine*, July, 1923) notes that at various times oxygen, used as a measure to be tried in extreme cases, has been found of absolutely no benefit. This is largely because it was used too late, or was given through a funnel inverted over the patient's face. Oxygen given this way does practically no good, as by this method the oxygen in the alveolar air is raised at most only 2 per cent.

Three atmospheres of oxygen give pneumonia to animals, and Lorraine Smith has shown that animals develop pneumonia if kept in an atmosphere of pure oxygen for several days, but 70 per cent or less oxygen can be breathed for any length of time without harm to the patient.

The hemoglobin is usually nearly saturated with oxygen in a normal person, but the hemoglobin only stores oxygen which it releases to the plasma as the latter gives up its oxygen to the tissues. About one-fortieth of the oxygen of the blood is carried in the plasma, and with increased pressure of oxygen in the alveolar air the plasma will carry more than it normally does. Bohr of Copenhagen demonstrated that, when the carbon dioxide in the blood is lowered, the hemoglobin will not give up its oxygen to the plasma, and the result is an anoxemia with plenty of oxygen in the blood. This may be overcome by adding oxygen with some rebreathing or some carbon dioxide.

Normal alveolar air contains 16.5 per cent oxygen. Delivered into the pharynx through a catheter in one nostril, it will raise the alveolar oxygen over 20 per cent, and if the other nostril is closed rhythmically the alveolar oxygen may be as high as 59.9 per cent. A Meltzer mouth tube for oxygen with rebreathing gave 34.6 per cent alveolar oxygen after nine minutes' use; repeated with nose clamped it gave 86.7 per cent. At this percentage the oxygen in the plasma is raised to seven times the normal amount.

During the war interest in oxygen revived. Hoover and others noted that, in cases with foam in the air spaces, oxygen relieved the cyanoses and anoxemia, but not the air hunger. By experiments, oxygen has been proved an essential to the life of the cells, and if it can be given the patient so that the oxygen unsaturation in the blood will be normal, or less than normal, the patient can frequently be tided over a critical period, in which lack of oxygen would irreparably damage his tissues, in particular his heart. Haldane has declared oxygen to be not merely a palliative measure, but one to help the body recuperate, as it is always trying to revert to normal. Improvement after oxygen usually lasts.

It is important to remember that anoxemia is often present without cyanosis or

air hunger. Air hunger has been shown to have no connection with oxygen-want, but to be caused by retention of carbon dioxide in the blood, which occurs, for example, when there is moisture in the air spaces; although carbon dioxide influences the respiratory center, oxygen-want also affects it, at first stimulating, and, if it persists, making it stop acting because of anoxemia. Promptly given, oxygen will start it again.

Barcroft, Haldane, Douglas, and others have shown the benefit of oxygen in gas-poisoning, pneumonia, and some other anoxemias, both as immediate treatment and for late symptoms, such as nocturnal dyspnea, palpitation, mental depression, etc. They use 35 to 60 per cent oxygen. A mask for giving oxygen with rebreathing was usually not borne well by their patients, and, though wasteful, they found a catheter inserted through the nostril to the naso-pharynx best. An oxygen room with 50 per cent oxygen, excess carbon dioxide being removed, was found excellent for hospital treatment, especially in late cases.

Stadie, Meakins, and others—more recently Barach and Woodwell—have proved the benefit of oxygen in pneumonia. The period before the crisis in lobar pneumonias is often saved from a fatal outcome by oxygen, and the recovery of all pneumonias hastened. Cardiac cases were also improved with oxygen treatment, but in a less degree.

Oxygen therapy is now being used in resuscitation work; surgical procedures, such as inflation of psoas abscesses, knee-joints and wounds, and in tuberculous peritonitis, with duodenal lavage in cases of fermentative and putrefactive dyspepsias; in asthma, cardiac disease, and many anoxemias, with more or less success.

At Stanford hospital oxygen is used in more than half of the anesthesia cases, not counting the oxygen used in nitrous-oxide-oxygen anesthesia. Before putting a patient to sleep we always make use of the breath-holding test, first mentioned by Stange of Petrograd, now used by Jones of Columbus and others. This consists in having the patient take, through his nose, a deep breath and hold it. Those who cannot hold it longer than ten to twenty seconds are poor anesthetic risks; thirty to forty seconds is the normal length of time the breath can be held. Among other indications this test gives us an idea of the oxygen need of the patient.

Our inductions are begun with a large percentage of oxygen with the nitrous oxide. This greatly lessens, or takes away, the sense of suffocation of which nervous patients especially complain. After a few breaths the oxygen percentage is reduced to about ten, in ordinary cases. By using a large percentage of oxygen with nitrous oxide, this mode of induction can be safely used on children, one or two years old, and ether added in the usual manner on the gas machine before changing to ether vapor or ether by drop method.

In rare instances when a patient has held his breath during induction, due to some reflex, and has become cyanotic, the writer has found that oxygen given through a mouth hook or through a catheter in the pharynx would relieve the cyanosis almost at once, even before the patient had taken a breath, showing that this oxygen reached the lungs, whereas oxygen given by any face mask at the same pressure would not change the patient's color until he took a breath.

The three physicians on the regular anesthetic staff at Stanford hospital have had ample opportunity, during the average of about 3000 cases a year, given or supervised by them, to compare the clinical differences of patients receiving oxygen and those not given any. In general these anesthetists have independently reached the conclusion that, besides the advantages just noted, an oxygen-ether anesthesia will usually be smoother, more even, with the use of considerably less ether to keep the patient asleep, than is necessary when a plain ether anesthesia is given. Their clinical observa-

tions verify the advantages noted by the many experimenters of late years who have tested the value of oxygen. Various definite tests and experiments have been planned but not undertaken. In actual practice during many years of use the writer finds most patients under anesthesia do better with oxygen out of all proportion to anything we so far know as the cause.

Fifty Cases of Carcinoma of the Cervix Treated with Radium.

DONALDSON and CANTI (*British Medical Journal*, July 7, 1923) report in satisfactory detail 150 cases of cancer of the cervix uteri treated by radium. They base their analysis of results upon the effect of irradiation on the four cardinal signs and symptoms—that is, hemorrhage, discharge, ulceration, and induration—and also upon the effect on the length of life and general comfort of the patient, so far as can be estimated at the present juncture.

The present-day knowledge concerning the action of irradiation and results hitherto published appear to the writers to be quite inadequate to justify any discussion as to the relative merits of this form of treatment as compared to operation, and the majority of people in this country agree that at present radical operations should be performed for carcinoma of the cervix wherever that procedure is possible, whether or not irradiation is employed in addition. Nevertheless, the most optimistic of surgeons cannot but deplore the small number of cases that can be said to be cured, considering the prevalence of the disease. It is therefore essential that we should no longer resign ourselves to this hopeless state of affairs, but should investigate fully the method which offers hopes of bettering the present conditions. It must be remembered that the treatment by irradiation is, comparatively speaking, in its infancy, and therefore, in spite of the promising nature of the results so far obtained, we must not at present expect to effect permanent cures. As has been seen, certain changes, such as the local disappearance of the growth, cessation of hemorrhage, diminution of discharge, and healing of the ulceration, have been observed, striking differences having been noted between the eight- and twenty-four-hour series. These facts promise to be of value in helping to discover the laws governing the biological effect of irradiation, without the knowledge of which it is extremely improbable that any true progress in the treatment is likely to result.

The quantity of radium in most of the cases has been kept a constant factor. The time of application has been eight hours or twenty-four hours in the two series respectively, so that the amount of irradiation of the tissues in the two series is in the proportion of 1 to 3. Such marked differences were obtained in the two sets of cases that irradiation for eight hours seems well-nigh useless, even if repeated on as many as three occasions; whereas even one exposure for twenty-four hours has a very marked effect, and has not infrequently led to the complete local disappearance of the growth.

In the twenty-four-hour series the most striking change is the disappearance of the growth from the cervix in over 60 per cent of cases of squamous-celled carcinoma. As is to be expected, this does not take place immediately; the earliest date on which it was observed was three weeks after irradiation, and this was in a case in which the whole uterus was examined. It is not possible to say how long carcinoma cells can persist after treatment, but it is interesting to note that evidence of new growth débris was present in a section taken forty-nine weeks later.

The authors are in accord with the general experience of others in recent years, to the effect that in the majority of cases patients suffering from carcinoma of the cervix cease to have hemorrhage, vaginal discharge, and ulceration after treatment with radium. Further, that in some of

those cases which are inoperable life is prolonged and the patients are enabled to lead useful existences. It would be premature at the present juncture to talk of cures.

The preliminary application of radium in those cases which are operable causes the disappearance of fungating growths or ulcers, so that the risk of infection and of implanting new growths from the cervix at the time of incising the vaginal wall is markedly diminished.

There is no doubt that the application of 173.6 mg. of radium element for twenty-four hours is markedly more efficient in bringing about this result than the same amount applied for eight hours, even when the latter is given on as many as three occasions.

Since histological evidence of the efficacy of Daels's method of irradiation of the pelvic glands is impracticable its value is still *sub judice,* as it depends upon clinical evidence.

Some of the Factors upon which the Successful Use of Local Anesthesia Depends.

FARR (*Illinois Medical Journal,* July, 1923) notes that in his practice local anesthesia has proved satisfactory in over 95 per cent of biliary and gastric surgery; by this he means satisfactory to his patients.

The solace offered to the surgeon by local anesthesia in the desperate surgical risk, whether due to systemic disease such as diabetes, cardiac or renal insufficiency, pulmonary tuberculosis, septicemia, advanced carcinoma, grave anemia, etc., or to the more acute conditions like biliary obstruction, perforated ulcer, hemorrhage, localized septic processes, or acute intestinal obstruction, cannot be gainsaid.

In order to use local anesthesia successfully in abdominal surgery something more than the mere establishment of anesthesia of the nerves is required. The use of the method involves a consideration of the patient as a whole, from the mental as well as the physical standpoint, the establishment of anesthesia of the thoracic and splanchnic nerves of the corresponding region, and a surgical technique befitting this form of anesthesia.

The process involves thoughtful consideration and training of all who come in contact with the patient in order to bring him through with the minimum mental anguish and maintain a psychical quiescence of the maximum degree.

The method of approaching the upper abdominal cavity and of handling the viscera so as to bring about the proper "setting" for the establishment of splanchnic anesthesia is as follows: It must be borne in mind that each step in the procedure is dependent for success upon the successful accomplishment of all preceding steps, and the adage "A chain is as strong as its weakest link" applies nowhere with more force than when carrying out a surgical procedure in the upper abdomen under local anesthesia. General bodily comfort for the patient is essential. The reversed Trendelenburg position is employed and the lateral tilt also where it is indicated. The incision is placed where it will allow the best possible access to the region involved.

Complete abolition of the muscular reflexes is insured by the induction of local anesthesia. The avoidance of reflex contraction of tissue outside of the actual area of the operative maneuvers is accomplished by the use of elastic continuous retraction, by which means the abdominal incision is gradually stretched, rather than torn or forced beyond its normal limits. Likewise the abdominal organs which do not glide away from the operative area through the force of gravity may be, through the agency of the spring retractor and a narrow gauze pack, gently and gradually forced out of the field. Concomitant with the accomplishment of these details the coöperation of the patient through the agency of the psycho-anesthetist may be enlisted often with the most surprising satisfaction.

Vertical retraction of the abdominal wall,

combined with the effect of gravity upon the movable viscera, will serve to separate the parietes from the underlying organs, thus giving one the exposure which is so greatly desired.

A successful carrying out of the above detailed régime permits at once the accomplishment of two important essentials: first, the opportunity for making a comprehensive visual survey of the local conditions, and second, if need be, the gentle palpation of any viscus by which its mobility may be ascertained or the "physiological test" which will be described below may be applied. However, it is unusual in the presence of a proper exposure for the necessity to arise for making extensive manipulation in order to arrive at a decision concerning the operative procedure which is to follow.

One occasionally meets with an abdominal condition in which upon exploration there remains a doubt regarding which organ harbors the offended nerves which have carried the impressions to the central nervous system. Manipulation of the suspected organs or tissues in the absence of intraperitoneal anesthesia may be the means of extracting from the patient a voluntary expression that the symptoms of which he formerly complained have been reproduced.

The nerve supply of the stomach, coming as it does from the splanchnic plexus, is, as a rule, easily reached. In case much manipulation is anticipated it is well to establish splanchnic anesthesia before handling the stomach to any degree. The retroperitoneal space may be painlessly exposed by gently retracting the duodenum downward and at the same time elevating the border of the liver; from 40 to 50 cc of solution may be introduced just beneath the peritoneum bilaterally to the common duct. The needle point should barely pierce this membrane, and the increasing edema should be constantly manifest as the solution is injected.

For the more simple work, such as anterior or posterior gastroenterostomy, a perfect exposure plus the appropriate technique will usually obviate the necessity of introducing splanchnic anesthesia.

A thorough examination of the ducts may be obtained by gently retracting the liver and gall-bladder upward as the patient breathes deeply, any adhesions being severed as they appear. The obese, those with high lying livers, and cases with advanced malignant or inflammatory disease may demand general anesthesia during this examination, but simple drainage without further manipulation should not give the least difficulty.

The technique which we have worked out for cholecystectomy, which has been performed in 90 per cent of our cases, is as follows: The duodenum is gently forced downward by means of a No. 6 wire retractor and a dry gauze sponge. In a similar manner the stomach is carried to the left and the colon to the right. The gall-bladder is then grasped by a forceps and a liberal amount of novocaine solution injected between it and the liver. The patient is then asked by the psycho-anesthetist to breathe deeply. As the liver advances it is rotated within the abdomen. A series of forced inspirations with the forceps maintaining every advantage in position gained by the gall-bladder allows the opportunity for the introduction of anterior splanchnic anesthesia. This should be established in every case as soon as the opportunity presents. One may now remove the organ preferably fundus first.

In case the appendix is to be removed the patient is now placed in the Trendelenburg position, the lower, outer angle of the incision fully elevated, and gentle traction made upon the cecum as it moves upward. Long forceps, one in each hand, will greatly aid in delivering this organ. Provided an extension of the incision is necessary it may be made at the rate of one inch per minute, so that little delay is occasioned by this contingency.

Reviews

ALCOHOL AND PROHIBITION IN THEIR RELATION TO CIVILIZATION AND THE ART OF LIVING. By Victor G. Vecki, M.D. J. B. Lippincott Company, Philadelphia, 1923. Price $2.

The literature on alcohol is assuming large proportions, the greater bulk of it, however, being the production of those who are opposed to its employment in beverages or as a medicinal substance. We do not intend to roll an "apple of discord" among our subscribers, some of whom are probably opposed to alcohol, although many others are not, when we refer to this book. Professor Starling of the British Isles, one of the most eminent of physiologists, has just written a safe and sane scientific contribution upon the use of alcohol; the whole trend of his text being that in moderation both as a beverage and often as a medicine it possesses very distinct value. He presents his text in a very judicious manner without any of the heat which the discussion of this subject seems to engender in the minds of many. Dr. Vecki has also attempted to give in his book an unprejudiced, comprehensive and clear exposition of the prohibition question. He is evidently not one of those who sides with the forces of prohibition, but rather with the forces of temperance, the latter word being generally abused in the sense that it is employed to mean prohibition when the temperate use of alcohol is intended. On the other hand it must not be forgotten that the author shows what has been accomplished by prohibition so far and who has been benefited by the drastic enforcement laws. He has even been brave enough to take up carefully the question as to whether prohibition can be enforced, and in another chapter deals with prohibition as it affects the medical profession. Following this he discusses the possibility of mitigating and even eliminating certain evils which have arisen from the drastic enforcement of prohibition laws.

Finally he emphasizes the fact that the key-note of happiness is temperance in all things and that temperance in prohibition is equally as desirable as temperance in drinking.

A very large part of the text consists in abstracts in quotation marks from the writings of many medical men and laboratory investigators. In one sense the book can be divided into two parts: that which deals with the scientific aspect of this subject, and that which deals with the social or political aspects of this important subject.

HABITUAL CONSTIPATION. Its Causes, Consequences, Prevention, and Rational Treatment. By Ismar Boas, M.D., translated by Thomas L. Stedman, M.D. The Funk & Wagnalls Company, New York, 1923. Price $2.

We confess that the first sentence in the preface by the author startles us in that he states that habitual constipation is a "disease" of civilization. It would seem more proper to speak of it as a functional disorder, since in the vast majority of cases it does not depend upon any definite pathological lesion. This criticism is of little importance if the book was intended for medical men chiefly, but it is evidently meant largely for the laity, because we are also told in the preface that the object of the author is not in any way to supplant the physician, but to second his efforts toward effecting a cure. In this same paragraph constipation is referred to as a disease a second time. So, too, in the final paragraph of the preface the author expresses the hope that he has been able to persuade the reader that chronic constipation is a disease that need not exist.

The book is divided into three parts. In the first there is discussed the nature, causes and consequences of constipation, and in the second the prophylaxis and treatment of it. This is, naturally, by long odds the longest part of the text, covering nearly 200 pages. The third part deals with the results of constipation in the space of 29 pages, and includes hemorrhoids, fissure of the anus, prolapse of the rectum, and the treatment of flatulence. Prescriptions are not included. Diet is, of course, discussed

in extenso, and it is needless to state that the author recognizes that drugs are often useful. The few illustrations are rather crude woodcuts, the type large, well spaced, and easily read. If the physician thinks it wise to place a book on this subject in the hands of his patients, we believe that this one is perhaps the best that he can recommend.

PEDIATRICS. By Various Authors. Edited by Isaac A. Abt, A.M., M.D. Volumes I and II. W. B. Saunders Company, Philadelphia, 1923. Price $10 per volume.

Carried to its conclusion, this work is without doubt the most exhaustive contribution to this subject which has ever been published, for the design is to bring out no less than eight octavo volumes totaling 8000 pages with 1500 illustrations, and a separate index volume free. The first volume contains 284 illustrations, and the editor tells us in his preface that the volumes are to be a collection of monographic treatises on subjects of interest in the diseases of infancy and childhood. Recognizing that there are many excellent text-books upon pediatrics in the English language, nevertheless it is believed that there is a demand for such an exhaustive publication.

We note with interest that preparation was made for the publication of these volumes early in 1914, but that the Great War made this impossible, and it is only since the armistice that the active preparation of the text has been carried on.

Our readers will recall that thirty-four years ago there appeared, under the editorship of Keating, an encyclopedia on children which filled three volumes, but the editor has felt that in these thirty-four years so much additional information has been gained that even a larger work should be taken up.

Volume I naturally deals with introductory material, the first chapter describing the earlier encyclopediæ which refer to diseases of children. This is followed by one upon the history of pediatrics. There are others upon congenital and acquired predisposition in heredity; anatomy of the infant and child; growth and development; metabolism in childhood; the hygiene of the home and of the school, climatotherapy, and the hygiene of crippled children. This text with the index covers 1191 pages, which are closely printed, the articles being accompanied by an exceedingly exhaustive lot of bibliographical references.

Volume II contains 180 illustrations and deals with the mortality of infancy; the physical examination of children; the study of the cerebrospinal fluid; the examination of children by the *x*-rays; the peculiarities of disease in children; heliotherapy; and diseases of the new-born and premature infants.

Practically every author in each volume is an active teacher of pediatrics in some prominent medical school. It would be an invidious distinction to name some without naming them all. Many of the names are familiar to the medical profession because of the contributions which they have made to this subject.

We congratulate Dr. Abt upon his enthusiasm and industry in arranging such a monumental work and in making such a happy selection of contributors, and we also congratulate the publishers upon their courage and ability to produce such a contribution to medical literature. We trust that these qualities in the editor and in the publishers will be recognized by the profession, this being manifested by an enthusiastic reception of the volumes as they appear. Certainly they will remain for many years, if not indefinitely, as the most remarkable contribution to pediatrics which has ever been made.

THE EXAMINATION OF PATIENTS. By Nellis B. Foster, M.D. W. B. Saunders Company, Philadelphia, 1923. Price $3.50.

Dr. Foster is known as an active practitioner and hospital clinician. His idea in preparing this book of less than 250 pages, which is heavily leaded and in large type, has been to help practitioners of medicine

to determine the facts on which an accurate diagnosis rests, for as he well points out, the most brilliant discoveries in therapeutics avail nothing if the patient's disease is not correctly diagnosed. He emphasizes the important fact that the development of laboratory methods has diverted attention from those refinements of diagnosis which consist in the use of the trained sense of touch, sight, and hearing. As we have pointed out before, it is an encouraging sign that medical men are recognizing that the pendulum has swung too far toward laboratory methods of diagnosis and is swinging back to that normal which may be called the art of medicine. Dr. Foster well points out that a positive throat culture of the Klebs-Loeffler bacillus does not make a diagnosis of diphtheria, since the individual may be a carrier or the organism may be non-pathogenic; and, he might have added, sometimes an error in technique will give a negative report when the clinician of experience is certain from the appearance of the pharynx or tonsils that a true and active diphtheria is present.

After discussing the theory of diagnosis and the method of taking the history of a patient, he proceeds to a consideration of the physical examination of the various portions of the body, devoting 36 pages to an examination of the surface and 90 pages to the physical examination of the respiratory, cardiovascular, digestive and genito-urinary systems, including rectal examinations and an examination of the female pelvic organs. Under neurological examination he utilizes 47 pages of text, dealing with the examination of the eye, the cranial nerves, and the methods of testing motor and sensory symptoms; dealing also with convulsions, coma, and lumbar puncture. The closing chapters of the book deal with the ear and throat, the joints and extremities, the breast, the use of tuberculin, and the Schick test in determining the presence of diphtheritic infection. The book is freely illustrated with charts and pictures of typical cases. It is a handy manual, not overburdened with detail, which any man in active practice will find useful.

CLINICAL DIAGNOSIS BY LABORATORY METHODS. By James Campbell Todd, M.D. Fifth edition, revised, enlarged, and reset; copiously illustrated in black and white and in colors. The W. B. Saunders Company, Philadelphia, 1923. Price $6.

In fifteen years five editions of Dr. Todd's book on Clinical Diagnosis by Laboratory Methods have been called for. As with most books that reach many editions, the last is considerably larger than the first, and its scope has been increased largely because of the advances which have been made in laboratory technique as applied to bedside medicine. This book will prove a useful companion volume to that of Dr. Foster which we have just reviewed, since it gives clear and useful directions to the physician as to the laboratory methods which are necessary when he needs to employ them in addition to those described in the book to which we have just referred. Including the index, the fifth edition of Dr. Todd's book contains 762 pages. The illustrations are excellent and the colored plates accurate. The present text is so good that we are more sure that a sixth edition will be called for than we were that the second would be needed when the book first appeared.

A MANUAL OF THE PRACTICE OF MEDICINE. By A. A. Stevens, A.M., M.D. Eleventh edition. W. B. Saunders Company, Philadelphia, 1923. Price $3.50.

We have recently reviewed in these pages the work on Therapeutics by this industrious author, and not long since noticed his book on the Practice of Medicine, which is exhaustive in distinction from the present one, since the former consists of 1106 pages, whereas this condensed manual contains only 645 with a smaller page. It will be noted that it is the eleventh edition, the first one having appeared thirty-two years ago.

For many years Dr. Stevens has been a teacher in medical schools, either as a quiz master or as a member of the Minor Faculty, and he is now the Professor of Applied Therapeutics in the University of Pennsylvania.

Little can be said of the eleventh edition

of this condensed manual, save to emphasize the point that when the author can condense the salient facts of this department of medicine, which is commonly called "Practice," so successfully that his condensation reaches an eleventh edition, he is to be congratulated. The author will indeed prove to be popular if the profession possessing one of his books on Practice sees fit to purchase another one. One thing is certain, namely, that he who purchases either will purchase something which is worth while.

AN INTRODUCTION TO MEDICAL BIOMETRY AND VITAL STATISTICS. By Raymond Pearl. Illustrated. W. B. Saunders & Company, Philadelphia, 1923.

Professor Pearl occupies the chair of Biometry and Vital Statistics in the School of Hygiene and Public Health, and Biology, in the Medical School of Johns Hopkins University, and is already well known to statisticians on both sides of the Atlantic. Indeed we have heard the story that an American going to England who wished to obtain the services of a first-rate statistician, was at once informed the best that could be found was the author of this volume.

This book is the result of many years' experience in attempting to teach biometric methods to biologists and medical men, and is perhaps as authoritative a publication as can possibly be obtained. The text is divided into sixteen chapters and five appendices, and there are 71 illustrations. Evidently the author is one who knows how to interest students in his subject, for he utters these practical words: "Whether the mathematician likes it or not, there are now, and there will continue to be, many biologists and medical men who are going to use biometric methods in their work whether they have any special mathematical training or not;" and he adds: "If we insist upon a mathematical approach to the subject at every point the net result with the vast majority of students will be simply to disgust them." This does not by any means indicate that the author belittles the value of a mathematical calculation in this subject, but rather his conservatism and common sense.

THE PRINCIPLES OF VITAL STATISTICS. By I. S. Falk, Ph.D. Illustrated. W. B. Saunders Company, Philadelphia, 1923. Price $2.50.

In this octavo volume of 258 pages the author, who is in the Department of Public Health at Yale University, discusses a subject which is of great importance to health officers, and which, we fear, interests physicians less than it should, unless they are engaged in public health work. The purpose of the book is to introduce the student to this subject by describing the more important procedures and sources of information which are commonly utilized in statistical inquiries, and to warn against certain points which the untrained statistician must observe if his vital statistics are to be of value. Obviously the text must deal, and does, with a discussion of what vital statistics are, with a discussion of the composition of the population, births, infant mortality, morbidity, general mortality, and the proper method of interpreting accumulation of figures bearing upon this subject.

A PRIMER FOR DIABETIC PATIENTS. By Russell M. Wilder, M.D., Mary M. Foley, and Daisy Ellithorpe. Second edition. W. B. Saunders Company, Philadelphia, 1923. Price $1.50.

The text of this little booklet of 119 pages was intended primarily for the use of the authors, replacing mimeographed sheets that were formerly depended upon. It is not intended as a treatise on diabetes, the authors including only that which the patient himself must know in order to cooperate intelligently with the physician in the management of the malady. It was thought wise to rewrite the text in preparing the second edition. The opportunity has been seized to incorporate directions for the use of insulin and to include certain recent ideas of diet adjustment and the use of fat mixtures which were formerly not considered permissible. Fifty new recipes have been added which have proved useful in diversifying the restricted regimen of

the patient. Possibly the general practitioner will find that these recipes will give him more value than any other part of the text.

Concerning the use of insulin we find, in italics, that it is to be remembered that if for any reason insulin is to be discontinued it is imperative to discontinue the high calorie diet and to return to the low calorie diet, with the addition that activities must be curtailed and that it is imperative for the patient to go to bed, remaining under these restrictions until insulin can be resumed.

PHYSICAL EXAMINATION AND DIAGNOSTIC ANATOMY. By Charles B. Slade, M.D. Third edition. W. B. Saunders Company, Philadelphia, 1923. Price $2.

In the space of 179 pages the author has prepared his text in such a way as to render it easy for students to take up the more advanced works on physical diagnosis. We think that he is right in believing that the initial course in physical diagnosis should be chiefly practical with a minimum of text-book study. In the present edition the author deals more fully than formerly with the physics of sound and has added a new section upon blood-pressure and the sphygmomanometer, which has been written by Dr. L. B. MacKenzie. The text fills the rôle intended by the writer in an excellent manner. The illustrations, which are frequent, are well chosen and do much toward elucidating the text. We note with interest the wise statement that the phonendoscope should not be used in the early years of study because it establishes a false idea of the relative character and volume of various sounds. There can be no doubt that the instruments of precision so-called which are now employed interfere with the proper appreciation of heart and lung sounds by the student and physician. The practitioner of years ago was forced to increase the acuity of his hearing by the constant employment of the naked ear or the single stethoscope, which fact, instead of being ultimately a cause of regret, was and is a distinct aid in the study of the cardiac and pulmonary sounds in every patient whose chest is being examined. Many murmurs can be heard with the naked ear that are not well heard with the double stethoscope or the phonendoscope.

EXERCISE FOR HEALTH AND CORRECTION. By Frank D. Dickson, M.D., and Rex L. Diveley, M.D. The J. B. Lippincott Company, Philadelphia, 1923. Price $2.

As our readers know a considerable number of books upon this topic have been published in the last few years. Recently we reviewed one quite similar to this. This is not to be considered as a text-book, but rather as an exercise guide. The authors divide their topic into bed exercises, setting-up exercises, and postural exercises, lying down and standing; so too there are foot exercises. The text begins with Exercise I, showing a man lying down, with a description underneath as to the movements through which he is to pass, and from there on each page contains from one to three illustrations with its accompanying descriptive text. The illustrations are excellent and the advice is equally good.

The book is one which can be placed in the hands of the laity without any hesitation, and many medical men by glancing over it will get points which will be useful to them in helping their patients.

MENTAL HYGIENE AND THE PUBLIC HEALTH NURSE. By V. May Macdonald, R.N.; with a foreword by Thomas W. Salmon, M.D. The J. B. Lippincott Company, Philadelphia, 1923. Price $1.50.

The author of this book, who was formerly the Assistant Superintendent of Nurses in the Johns Hopkins Hospital, has been fortunate in obtaining a foreword to it by the Professor of Psychiatry in Columbia University. In the brief space of 67 pages she has endeavored to impress upon her readers the need of mental hygiene both in the sick and well. The author, therefore, has chapters upon the mental health of children, preventable forms of mental disorder, upon mental defectives, and upon the prevalence, cost and national results of mental disorders, with a discussion of the

need for educational agents and also a consideration of the necessary training to recognize cases that need special advice.

THE INFANT AND YOUNG CHILD. By John Lovett Morse, A.M., M.D., Edwin T. Wyman, M.D., and Lewis Webb Hill, M.D. The W. B. Saunders Company, Philadelphia, 1923. Price $1.75.

The preface of this book begins with these words: "In this little book the writers have endeavored to tell mothers what they should know in order to intelligently feed and care for their children from the time they are born until they are six years old." They have also attempted successfully to anticipate and answer the questions which mothers are in the habit of asking about the care of the children and the details of their daily life, and they give advice in regard to the diseases of infancy and early childhood, with particular reference to telling the mother what not to do while she is waiting for the physician to arrive.

Including the index there are 271 pages, a considerable number of which are taken up with a discussion of diet. There are also chapters upon the "Wet Nurse," "Breast Feeding," "Clothing," "Bathing," "Traveling," "Sleep," "Rest," "Exercise and Fresh Air."

The volume is eminently practical, well within the limits of a book intended for the laity, and can be cordially recommended.

THE CHEMICAL BASIS OF GROWTH AND SENESCENCE. By T. Brailsford Robertson, Ph. D., D. Sc. The J. B. Lippincott Company, Philadelphia, 1923. Price $3.

Dr. Robertson is the Professor of Physiology and Biochemistry in the University of Adelaide, South Australia. He has divided his text into the Physical Manifestations of Growth in Man and in Animals, the Reproduction of Unicellular Organisms, with a consideration of food factors in growth and life, and a chapter upon Retarding Influences in Growth. He also discusses the influence of special agencies in growth, as lecithin, cholesterol, the anterior lobe of the pituitary body (which is now sold on the American market under the name of antuitrin), tethelin, thyroxin, and other special agencies.

Having a definite scientific trend, the general busy practitioner will probably hardly find time to follow the scientific text presented by the author. Those who are interested in hygiene and public health, in the care of the youth, and the question of dietetics will learn much from a perusal of the pages of this book.

While the author recognizes that we are not in a position to-day to interpret fully the phenomena of life, he believes that we are on a path leading to this end, and his design has been to enable others to follow that path more readily than he has found it possible to follow it as he passed from point to point in his study of the subject.

THE INTERNATIONAL HEALTH BOARD OF THE ROCKEFELLER FOUNDATION. Ninth Annual Report, New York, 1923.

No one has any conception of the widespread efforts that are being made by the Rockefeller Foundation to combat disease all over the world until he has had an opportunity to peruse this report. On one of its first pages is a map of the world, showing, by dots and other marks, the areas in which the campaign is being carried out: in North America, Central America, South America, Europe, Asia, Japan, China, and Australia. The chief points of attack are the hookworm, the malarial parasite, the mosquito in connection with malaria and yellow fever, tuberculosis, and dissipation of ignorance by public health education. Interesting illustrations are on many of the pages, either of pictures of individuals or groups of individuals, or in telling diagrams showing results accomplished. Much information is also contained as to the measures from the standpoint of hygiene and therapeutics which have been instituted toward carrying on the work. As an example we note that in Fiji 42,000 treatments for hookworm were administered with excellent results as to the removal of the worm and with very few untoward effects. In the next 8000 cases

there were three deaths, occurring in a boy of seven, another of five, and the third in a woman, but in all of these it would appear that by some error an impure sample of carbon tetrachloride was employed.

One of the most remarkable things in the history of the world is that after the accumulation of immense wealth a man should be moved to do so large an amount of good not only to his fellow countrymen, but everywhere in the world.

A Text-book of Anatomy and Physiology. By Jesse F. Williams, M.D. W. B. Saunders Company, Philadelphia, 1923. Price $3.

It must be clearly understood that this volume of 523 pages with no less than 369 illustrations is intended for schools of nurses, normal schools, and colleges, and not for medical men. Essentially, therefore, it must have a comparatively limited field. The text is divided into 19 chapters. The illustrations are well chosen and practically all of them taken from other sources. When we say that they are well chosen, we use this term advisedly, since nearly every one is so associated with the meaning of the text as to be of direct value.

The number of books prepared for this class of students is now very large. This is one of the best.

Précis de Pathologie Médicale. Tome II, Maladies de L'Appareil Respiratoire, par Fernand Bezançon, Professeur á la Faculté de Médecine de Paris, Médecin de l'hôpital Boucicaut, et S. I. de Jong, Médecin des hôpitaux de Paris. Masson et Cie, Éditeurs Libraires de L'Académie de Médecine, 120. Paris, 1923.

The second volume of the handy Pathologie Médicale deals with diseases of the respiratory tract. The opening chapter of twenty-eight pages on the anatomy of the respiratory system is followed by two pages on physiology, a rather marked disproportion. The clinical sections are ample, modern, and characteristically lucid. Asthma is dealt with most exhaustively. At first it would appear that by giving twenty pages to symptoms and etiology and but one to treatment, the authors had been unfair to the latter phase of the subject, but a careful perusal of the single therapeutic page convinces one that with true Gallic precision all the essentials have been packed into it.

Pneumonia and syphilis receive full consideration in well illustrated chapters. Actinomycosis seems to have been omitted. In the treatment of acute pulmonary edema the authors advise bleeding as the only valuable measure. Bleeding is undoubtedly efficacious, but a hypodermic injection of morphine and atropine often acts as well, and can be given with a minimum of delay.

Diseases of the pleura, pneumothorax and mediastinitis form the concluding chapters of this excellent volume.

D. R.

Hematoblast. By Georges Hayem, M.D. With an introduction by Dr. L. Rivet. The Press of the University of France, Paris, 1923. Francs 25.

This book, as its title indicates, deals with what the author calls the third element of the blood, Hayem having begun his researches no less than forty-six years ago. The opening pages by Dr. Rivet deal with the literature of the subject, providing a historical bibliography, which, unlike many Continental books, contains references to English and American investigations as well as those which have been made in France.

Following the text provided by Dr. Rivet, there is a bibliography of Hayem's communications and studies upon the physiology and pathology of the blood extending from 1877 to 1915.

It may be said of Hayem that his position in regard to blood study may almost be considered equivalent to the position of Charcot in neurology and Bernard in the physiology of the nervous system. The book discusses not only the hematoblast so-called as they appear in different periods of life and in different conditions of the body, but also their importance in the study of the physiology and pathology of the blood, and their influence upon normal and pathological processes in this tissue. A considerable number of colored plates are introduced.

INTERNATIONAL CLINICS. A Quarterly of Illustrated Clinical Lectures and Especially Prepared Original Articles. Edited by Henry W. Cattell, A.M., M.D. The J. B. Lippincott Company, Philadelphia, 1923.

The sections of this issue of the International Clinics are divided into Diagnosis and Treatment, Morbid Psychology, Pediatrics, Medicine, Surgery, and Remarks on Hanging by the Editor. Amongst those on Diagnosis and Treatment is one by Drs. Petty and Sherrill on the Technique of Blood Sugar Estimation; another by Thompson of Chicago on the Care and Treatment of the more Common Diseases of the Eye, Ear, Nose, and Throat; while Berkeley contributes Some Notes on Thyroid Therapeutics. Walsh of New York writes on the Therapeutics of Pain, and Moore of Washington upon the Psychology and Prevention of the Mental Breakdown. A very considerable number of plates, charts, and figures and one colored plate are found in the volume.

VICE AND HEALTH PROBLEMS — SOLUTIONS. By John Clarence Funk, M. A., LL.B. J. B. Lippincott Company, Philadelphia and London.

This book, appropriately dedicated to the League of Women Voters, because their interest and inspiration will do much for good morals, good health, and good living, is a sane, sound and dispassionate exposition of existing conditions and offers a rational method of bettering them. Funk approaches the subject from the health standpoint, avoids preaching, and sets forth facts which should convince the world that the centuries old policy of ignoring the greatest health menace of all ages should no longer be tolerated, since there are methods by which venereal disease may be avoided and means by which it may be rendered non-transmissible when acquired, which should be universally known and practiced.

The book deals with Prostitution and its Causes, its Manifestations, its Business Side. It discusses briefly the government's fight against it, then takes up medical measures, law enforcement, medicolegal measures, education, welfare, and rehabilitation.

There is a final and excellent chapter on Good Government. He believes the best promise of this lies in the woman's vote.

This is a book to be commended without reservation, which should be read by every adolescent and adult in the country.

EXCURSIONS INTO SURGICAL SUBJECTS. By John B. Deaver, M.D., and Stanley P. Rieman, M.D. W. B. Saunders Company, Philadelphia and London, 1923. Cloth, $4.50 net.

Under this somewhat unusual title the authors consider the subjects of Peptic Ulcer, Jaundice, Diseases of the Bile Passages, Trials, Tribulations and Choice of a Surgeon, Some Surgical Conditions of the Intestinal Tract, Pasteur's Contribution to American Surgery, Medical Education and Educators and Living Pathology.

This brochure is characterized throughout by Deaver's vivid personality expressed by phrases as keen as his scalpel, and so picturesque as to leave a lasting impression.

The work of Deaver, the clinician, is admirably supplemented by that of Rieman, the experimental pathologist. Deaver states that "John Hunter was undoubtedly the giant intellect of dead pathology, while Lawson Tait merits the honor of having given place to living pathology as the foundation of rational surgery. This contribution, together with anesthesia and asepsis, is the Promethean gift of all time to clinical surgery."

He who reads these "Excursions" (and all members of the profession should so do) will close the book with a larger respect for his calling, a wider knowledge of its achievements and its possibilities, and a stronger determination to so play his part as to add to its honors.

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